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SHANGHAI-NANKING RAILROAD

VOL. III: No. 4. MANILA, SHANGHAI AND YOKOHAMA, SEPT., 1906

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THE FAR-EASTERN REVIEW



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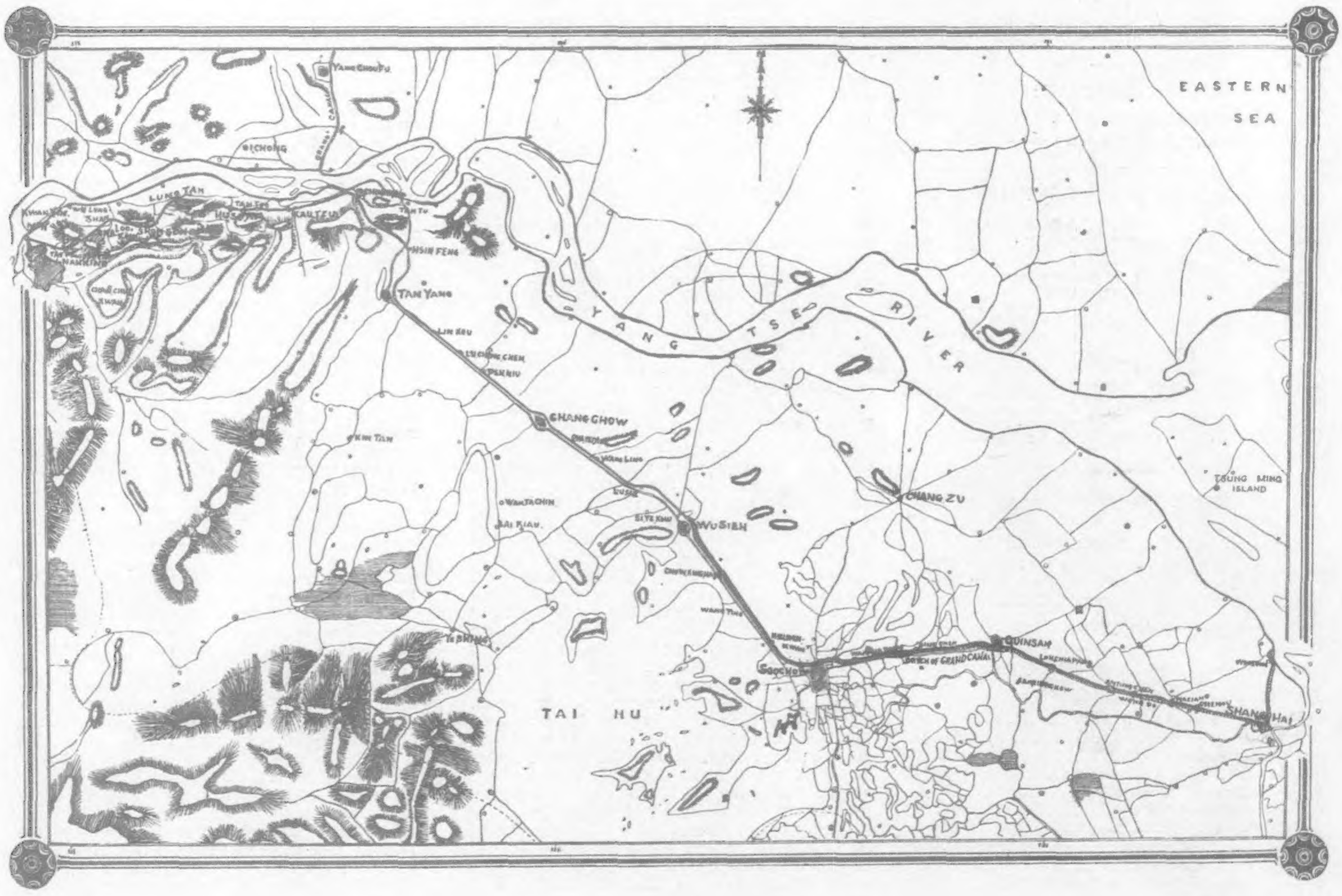
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THE FAR EASTERN REVIEW

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SHANGHAI-SOOCHOW-WUSIEH SECTION OF THE SHANGHAI-NANKING RAILWAY SYSTEM



MAP OF THE SHANGHAI-NANKING RAILWAY

The second section of the Shanghai-Nanking Railway, comprising about 80 miles, is now in operation, and two passenger trains and several freights are running daily between Shanghai and Wusieh, which are the terminal points of this division. This railway is being constructed by the British and Chinese Corporation under concessionary grants from the Peking Government. The joint agency of the corporation is controlled by the well-known firm of Messrs. Jardine, Matheson & Co. and the Hongkong and Shanghai Banking Corporation, the former looking after affairs in connection with the construction and operation of the system, and the latter the financiering of the project.

An idea of the importance of this Railway may be gleaned from an extract from the address of Taotai Shen Tung Ho, of Shanghai, delivered at the ceremonies which attended the formal opening of this new section, which occurred in July. He reminded his hearers that the Province of Kiangsu, in which both Shanghai and Nanking are situated, has an area of 44,500 sq. ms. with a population of more than 38,000,000 people; so that, while the province is smaller than England in area, it possesses one-third more population. And as the line passes through the most fertile portion of the province its expectations may faintly be realized.

ENGINEERING FEATURES.—The road construction between Shanghai and Wusieh produced no particular engineering difficulties; it rather called for painstaking care. The surface is almost entirely of alluvial deposit with an underlying strata of silt, and the

(Continued on page 114)

THE FAR EASTERN REVIEW

GEO. BRONSON REA, M. E.
PUBLISHER AND EDITOR

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MANILA, SHANGHAI AND YOKOHAMA, SEPTEMBER 1906

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SUGAR REFINING IN THE FAR EAST.

The "Hongkong Telegraph" in its issue of August 7th, ulto., reviews the condition of the sugar refining industry in Hongkong, and after recognizing the inevitable competition from Japan, ventures the opinion that, given a fair field and no favors, the local companies can hold their own against any competitor. This is undoubtedly true as regards the Eastern markets outside of Japan. In this country everything points to an early monopolization of the refined sugar business by the Japanese refineries. The trade returns indicate that Japan will continue to increase her imports of raw sugars, and correspondingly diminish the imports of refined grades until her local consumption is fully covered. How far this consumption is capable of extension depends on the education of the Japanese to a preference for the refined article, and the ability of the refiners to keep the price within the purchasing power of the poorer classes. With this big home demand to supply and cater to, under natural conditions, it would be a long time before Japan will figure as a competitor with Hongkong for the supply of China and other markets.

Japan and Hongkong receive their supplies of raw sugars from the producing centers of Java and the Philippines, and are placed on equal footing in this respect. The difference in freights and labor favors Hongkong in determining the cost of refining and their ability to control the market. With the conventional tariff on refined sugars in Japan of about six tenths of a cent per pound, it gives a practical monopoly of the home market to the Japanese refiners, and even with a rebate on exports they can not hope to overcome the advantages enjoyed by Hongkong, on supplying the China market, unless they receive certain concessions in freights from subsidized lines that will make it possible to compete. If the present policy of Japan is any indication of what may happen in the future, this lowering of freights in favor of the Japanese product will be the determining factor on which the trade will swing.

In 1900, Japan imported raw sugars to the value of Yen 11,007,634 and in 1905 to Yen 13,046,772. In 1900 the imports of refined sugars amounted to Yen, 15,598,894 of which Yen 9,448,860 came from Hongkong, while in 1905 the imports of refined had dwindled to Yen 659,415 of which only Yen 178,516 was supplied from Hongkong. These figures from the Japanese official reports, show that in the short space of five years the trade formerly enjoyed by the Hongkong refiners with Japan has been practically wiped out, and is a striking object lesson of what the world must expect in other lines of industry. Up to the present sugar does not figure in the exports from Japan, and by the time their refiners have covered the home market and are ready to reach out for the China field, another formidable factor will have appeared in the field. The passage of the Philippine Tariff Bill will eventually lead to the establishment of one or two large refineries in the Islands, or to the erection of large modern central factories where it will be comparatively easy to manufacture a sugar white enough for the Eastern Market with little or no extra cost.

Japan has a supply of about 50,000 tons from Formosa, and is making an effort to develop this industry by government subsidies. In the last four years, including the estimates for the present year, the Government will have expended Yen 644,000 in the encouragement of the sugar industry in Formosa . This field will, however, never assume any great importance as a producing center, except under the stimulus of heavy government bounties or a high protective tariff, as the sugar content of the cane is not high enough to make the venture profitable. The Japanese evidently recognize this, and their avowed intention of creating a beet sugar industry in Manchuria, indicates that they are keenly alive to the facts of the situation, and are determined to hold their own in the coming struggle for the control of the Eastern markets.

THE YUNNAN RAILWAY

"Many articles and communications from correspondents about the progress of work on the Yunnan Railway and the treatment of the Chinese laborers employed by the contractors, have appeared in the press of the Far East during the last month.

"The country traversed by the road is in a part of the world rarely visited by travellers, and reliabe information and data is difficult to secure. The *least* authentic information came from Mr. Little, who made the trip down to the coast from Yunnan, but his narrative is more of a descriptive nature than interesting to engineers."

The above appeared in our last issue, and owing to an error of proof reading an unintentional slight was given to Mr. Archibald Little's interesting description of this remote part of the world. The word "*least*" should read *latest*, placing quite a different meaning to the sentence.

A PHILIPPINE PENAL COLONY.

In this issue will be found an interesting article on the new penal colony on the Island of Palawan. As stated in a previous editorial on this subject, the question of providing suitable employment for the native convicts has been given considerable thought and study on the part of the Secretary of Commerce and Police, Hon. Cameron Forbes. Following the excellent example set by other countries in the East, the plan of establishing a large penal colony on an undeveloped island has been selected as the best solution to the present vexatious problem, and work has been progressing for some time.

The scheme, as worked out, must prove successful, and eliminate one great cause of friction between the government and local merchants.

In sending down a new man to manage the colony, one free from the influence of the present prison officials, the government has made a wise move, and one which should convince the community that it intends to push the scheme through. It will be some time before the permanent barracks are planned and built, and the congestion relieved at Bilibid, and the manufacturing enterprises of this institution confined to their proper scope.

OUR PROBLEM

The inauguration of Governor General Jas. F. Smith opens up another chapter in the history of our occupation in these Islands, the conclusion of which will determine largely the success or failure of our mission here. We are familiar with the policy of the Government which hopes that ultimate success will be attained through the education of the present generation, and we have consistently taken the opposite view that, unless we develop the Islands and give the masses work and increase their material wants and prosperity, all other efforts will be wasted and result in disaster.

The new administration of affairs in the Islands will have to confront this commercial problem, and be judged according to its ability to bring prosperity out of bankruptcy and disaster.

There are many who hold divergent ideas as to the means by which the desired end can be reached, but we stand to our conviction that free trade with the United States is the only solution to the present financial depression, and until this concession is secured from Congress, all effort of the new insular administration to ameliorate our situation will be handicapped.

THE FAR EASTERN REVIEW has consistently labored to secure the passage of the bill embodying the granting of free trade with the Islands, and has carried on a campaign of education amongst the merchants and manufacturers of the United States in regard to our great possibilities.

For over two years, some 1500 copies of each issue of THE FAR EASTERN REVIEW have been circulated amongst the merchants,

manufacturers and financial institutions of the United States, which has resulted in attracting attention to the Philippines and other countries of the Far East. But yet, we feel as though all our labor is lost unless we can further educate American capitalists, and bring about a feeling which will force the Senate to grant us the one boon which will place us once for all on the road to prosperity.

With this end in view, we have gradually extended our sphere of influence in the East, to make our paper more valuable, and now we propose to open a permanent office in New York, where we can get into closer contact with our manufacturers and contribute our share in the campaign for developing the Islands. Our proprietor, Mr. Rea, expects to sail for the United States in the near future, to personally take charge of the new office, and lend his efforts to promoting the Islands in the financial center of the country, and cooperating with the Government and commercial bodies in bringing about a change of feeling concerning the Islands.

HEMP MACHINERY COMPETITION

Under the old Spanish régime, that government kept a standing reward of $100,000 for the person who would successfully invent and operate a hemp-stripping machine. The importance of such an apparatus for the economical treatment of our principal staple was thus early recognized, and as the demand for hemp became greater, the scarcity of labor compelled the employment of some mechanical means to offset this disadvantage. The crying need of the Islands is the invention of some machine which will develop our great natural resource, and so cheapen the product that it will obviate the use of the many inferior fibers, the demand for which is encouraged because of the backward state of the great industry nature has centered in these Islands. The prize to the successful inventor is a great one, as it means the rapid accumulation of a large fortune, and a place in the ranks of the world's great benefactors.

The inventive instinct of Americans has been brought into action to solve this problem, and from time to time since our occupation various individuals have perfected plans and patents of machines for this purpose. Several of these have already been built, and private experiments conducted at great expense to insure a perfect machine before offering it to the public.

Mr. Lindsay, Castle Bros-Wolf & Sons, M. A. Clarke, Mr. Solignac, Mr. Wheeler, Captain Leonard and other prominent commercial and professional men are at present interested in new hemp stripping machines, and now the Director of Agriculture has entered the field with a commercial machine, which was recently tested at the Government Experiment Station in Manila.

The race for public favor is a keen one, and the successful machine will soon command a large sale and great profits. In view of this condition the race should be clean cut, open, fair and equitable for all contestants, without the suggestion of official favor to any one machine. The natural impulse of trusting inventors is to seek such aid, information and sympathy as may be at the command of the Government through the natural channels of the Bureau of Agriculture, and their first endeavor, after the completion of such a machine, is to secure an official indorsement of its merits. Such an approval would be worth thousands of dollars to any firm in opening up the market and interesting the natives in buying the machines. Several such machines were officially tested by the Agricultural Bureau last year, and according to the report of the Bureau of Agriculture were failures.

Of course it is urged that the Government is absolutely impartial in these tests of machines and every inventor will be given a square deal, but human nature is so constructed that it will take a powerful lot of explanation to make the ordinary inventor believe that he will receive favorable consideration from a Bureau whose Director is interested in the sale of another type, or that the official machinery manufacturer will not use his position to further his own ends to the detriment of other less favored competitors.

There seems to be considerable grounds for this attitude on the part of the man in the street, for we find that the Director of Agriculture has already gone out of way to publicly criticise those types of machines not built according to his ideas and his patent, but which other men are struggling in the open field to have recognized, without the powerful prestige of the Government to uphold and push them towards success.

The last Report of the Bureau of Agriculture, under the head of hemp machinery, has the following statement: "By means of correspondence, and through the columns of the 'Scientific American' this subject has been brought to the attention of American inventors and manufacturers, with several of whom we are now in communication. To our local inventors we have offered every possible encouragement and assistance in the way of suggestion, raw material and facilities for testing machines."—"During the past half year two different machines have been officially tested by this bureau. The model of a third machine has been submitted for our inspection and the machine itself will be ready for use in a few weeks."

During all this time when the Bureau was in correspondence with American manufacturers and inventors, and giving suggestions to local inventors, inspecting models and passing on their merits officially, the head of the Bureau was quietly perfecting the plans for his own machine. And yet the Government cannot imagine why the business community doubts its sincerity and the purity of its officials. It might be urged with some justice that a Government official has a perfect right to exercise his inventive genius, or adapt an old principle to his machine, so long as the desired end was accomplished, but when, in his official capacity, he is receiving through his bureau the confidences of other inventors who look to him for that aid to which they are entitled, the ethics of the proceedings are not all that might be desired, and opposed to the best ideas of Government. When we add to this feature the fact that the official still retains his position where he can influence the sale of his machines to the detriment of others, there is just cause for complaint. We have other good men in Manila who hold to views quite the opposite to those advanced by the official and who are quietly spending money to perfect their ideas without any chance of publicity except through paid advertisements in the public press, but with the competition of the official inventor, it is being urged in official reports and signed newspaper articles that his idea alone is right and the others wrong. In his report as Director of Agriculture for last year, Mr. Wellborn goes out of his way to decry the light machines and indorse the type of machine he was then having patented, and again in the Anniversary Number of the *Daily Bulletin*, in an article over his signature he again points out the demerits of competing machines and calls attention to the superior qualities of the type he was soon to place on the market.

Mr. Solignac, a prominent lawyer of this town, has been working for some months to get his machine before the public, and there are others who feel that they can not expect a square deal in competition with an official who has the prestige of his position to push the sale of his patent, and now that his machine is actually on the ground and has been given an official test, it would only be fair to all parties concerned if the Director of Agriculture should meet the opposition on equal grounds.

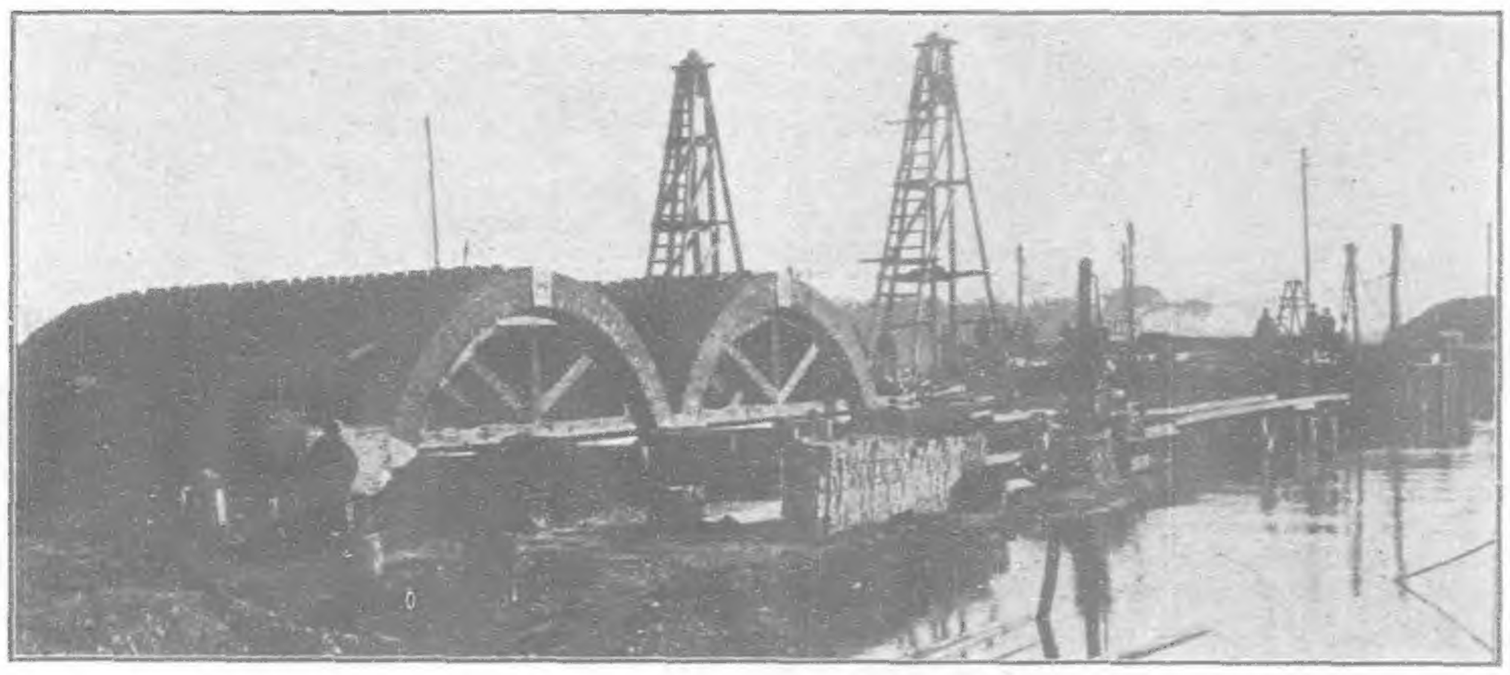
Without entering into a discussion of the ethical points involved, common fairness demands that Mr. Wellborn should resign his high position, and enter the commercial field on the same basis as the vendor of any other machinery, and leave the merits of his invention to be officially passed on by some one not financially interested. Otherwise the situation will remain unpleasant, and the government open to continual criticism. We believe no public official can legitimately hold office and at the same time be in a position to advance his private interests. The very semblance of such a state of affairs is sufficient to cause a scandal. The mere suggestion in Washington that some officials were interested in certain lands along the lines of the projected railways, was sufficient to call for an explanation which averted what threatened to result in a Senate investigation, and any similar raking of Philippine muck should be stopped at once.

MR. ELSER'S RETIREMENT

During the absence of the publisher of THE FAR EASTERN REVIEW in the United States, covering a period of about eight months, Mr. E. E. Elser, Assistant Manager of the well-known firm E. C. McCullough & Co., Inc., kindly performed the duties of Business Manager of this publication. Recently the business department of THE REVIEW was reorganized, Mr. Elser retiring. THE REVIEW wishes to publicly acknowledge the splendid service Mr. Elser rendered during his incumbency.

THE SHANGHAI-NANKING RAILWAY

Railway construction after modern engineering practice is splendidly exemplified in the work being done on this important line, which, when completed, will open up one of the finest agriculture districts in North China. While the line is being constructed under the nominal provisions of a British-Chinese concession, it is notable that the British interests have had almost exclusive control of the project both in the matter of financing and construction. The second section of the road, from Shanghai to Wu Sieh, was recently opened for traffic, and splendid trains are now being run regularly between these two points with a prospect of the operation of the entire line through to Nanking within another year. While these details are slightly aside from the engineering features of the project they lead up to the splendid work of construction which characterizes not only that part of the road now in operation, but that under way. Messrs. Jardine, Matheson & Co. have had exclusive control of this part of the work and have furnished all the materials. Under the able direction of Mr. Collison, the engineer-in-chief, the construction is all that could be desired. While up to the present time there have been few difficult engineering features to overcome, yet, when the fact is taken into consideration that railway construction in China is difficult under the simplest conditions, the manner in which the work is being carried on is noteworthy. The road work is equal in stability to any to be found in other parts of the world where such construction is within easy reach of the base of supplies, and the culvert and bridge work is second to none. The latter construction is exclusively reinforced concrete where that material can be used. The station houses are of substantial brick construction, and altogether the line has the appearance of permanency and stability. The cement used in this construction is the famous "Tongshan" brand manufactured by the Chinese Engineering and Mining Company, and has given eminent satisfaction. Altogether, the Chinese are to be congratulated upon the splendid railway that British engineering and financial enterprise is accomplishing for them in the Shanghai and Nanking line.



SHANGHAI-NANKING RAILWAY: BRIDGE ARCHES NORTH OF SOOCHOW

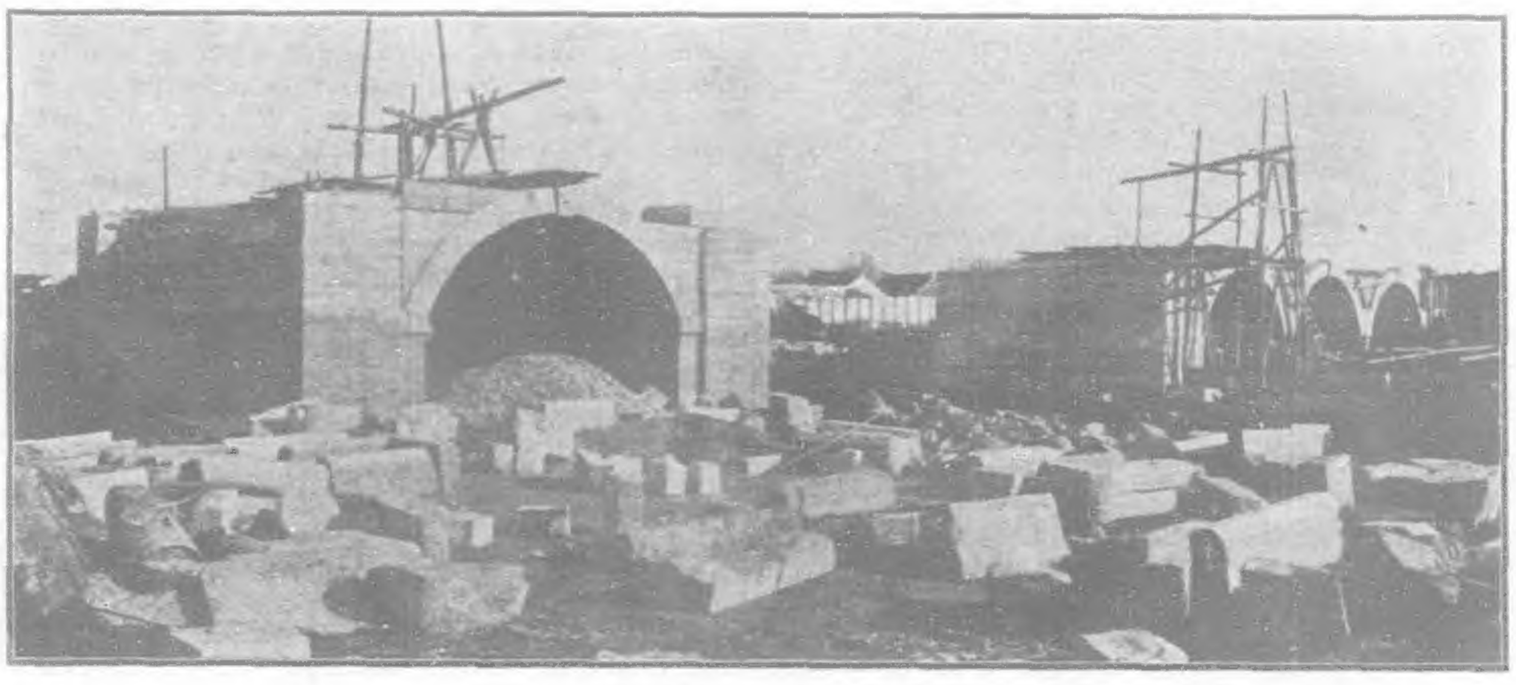
SHANGHAI-SOOCHOW-WUSIEH SECTION OF THE SHANGHAI-NANKING RAILWAY SYSTEM

(Continued from page 111)

route is through a country that is rich in agriculture and as level as a billiard table, figuratively speaking. The surface had to be carefully prepared for the roadbed, and finally a 2′ layer of ballast superimposed. The ballast is principally broken Soochow granite with a strain of limestone throughout, and the road has been built with all the care and solidity of a grand trunk line, and can not but furnish a most useful object-lesson to the Chinese for the lines they seem eager to construct for themselves in other parts of the empire. Aside from embankment, bridge and culvert construction on a small scale the laying of the tracks was uniformly uninterrupted, but it is understood that the engineering features of the construction from Wusieh to Nanking, *via* Chinkiang, are quite difficult, there being several heavy grades to overcome besides the boring of a tunnel something over 1500 yds. at Chinkiang which is giving the engineers considerable trouble on account of the frequent caving of the earth. The Shanghai-Wusieh section of the line was commenced about 15 mos. ago, and the whole railway is expected to be completed by the spring of 1908. Beyond Wusieh much of the construction is in an advanced stage and ground has been broken at intervals all the way up to Nanking, 193 ms. from Shanghai.

The line consists of long stretches almost perfectly straight. There are few gradients. The country is interspersed with numerous creeks and water courses, of which, between Shanghai and Soochow alone, there are 160. Owing to the unstable soil foundations cofferdams had to be resorted to in a number of instances. One viaduct over Quinsan Creek is 400′ on brick piers and steel girders, with arch approaches.

A considerable difficulty is being dealt with in connection with the construction in the shape of the graves, which, to the number of many thousands, dot the entire route from one end of the line to the other. Each individual family has to be dealt with, a fresh burial site purchased or allotted, and the necessary rites and ceremonials carefully attended to in connection with the transfer of corpses. As may be imagined, this calls for no small display of tact and that it has thus far been achieved without a single instance of a riot is sufficient proof of the careful diplomacy of the officials to all who know the Chinese and his violent passions and superstitions towards their dead.



SHANGHAI-NANKING RAILWAY: BRIDGE ARCHES UNDER CONSTRUCTION, SOUTH OF SOOCHOW

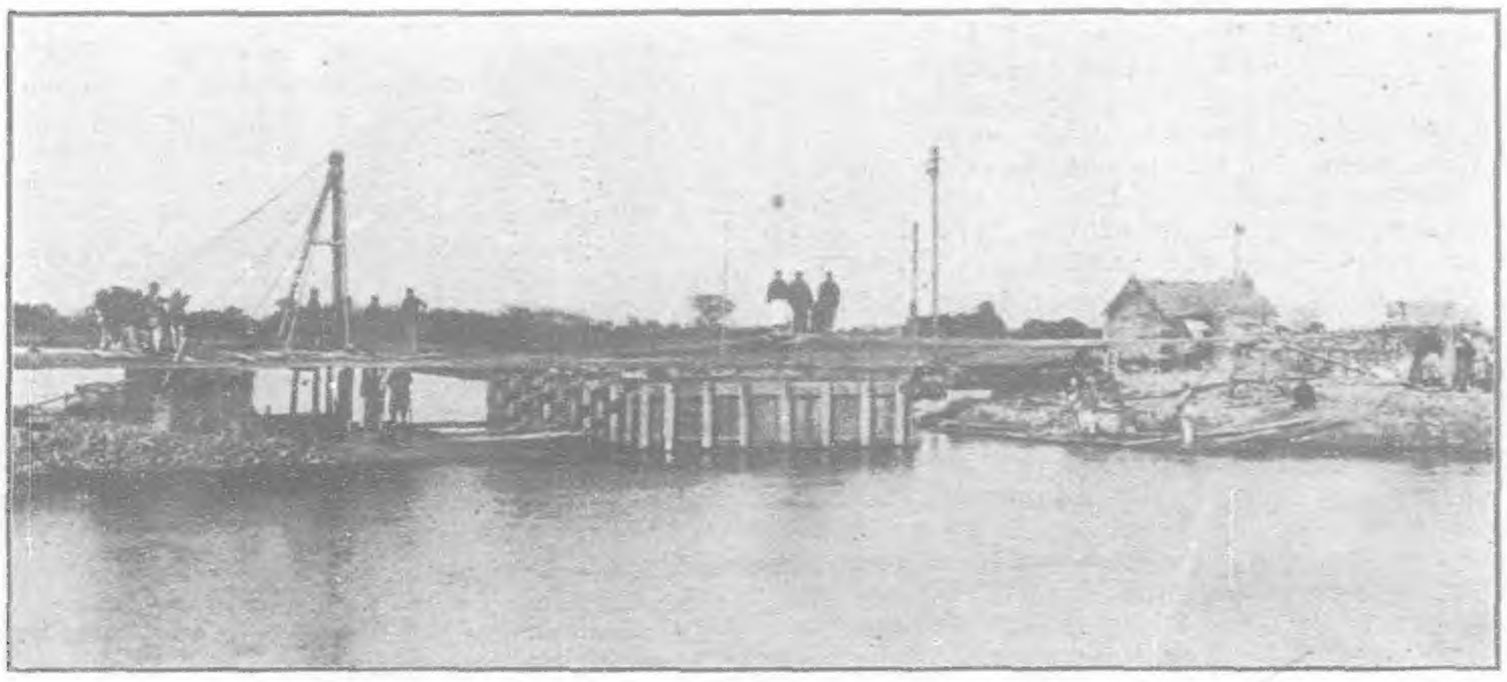
The line is at present but a single track through to Wusieh, although it is intended that it shall be doubled-tracked from Shanghai to Soochow in order to provide for the line from Soochow to Ningpo and Hangchow, for which the British and Chinese Corporation has a concession. With this in view the route for double tracks has already been laid out, all the bridges and culverts have been constructed to the full width, and everything is ready for the ballasting of the road and the laying of the rails. All arch bridges and culverts and the foundations of the few girder bridges throughout the entire system are being constructed of reinforced concrete.

CONSTRUCTED UNDER BRITISH CONTROL.—The railway is being entirely constructed under British control, and the materials, equipment and machinery are also British or colonial. The ties are of Jarrah hardwood, a splendid structural timber furnished by Messrs. Jardine, Matheson & Co. from Australia. The steel rails are 80 lbs. and 36′ in length, and are being supplied by Messrs. Guest, Keen & Nettleford and by Cammell, Daird & Co.

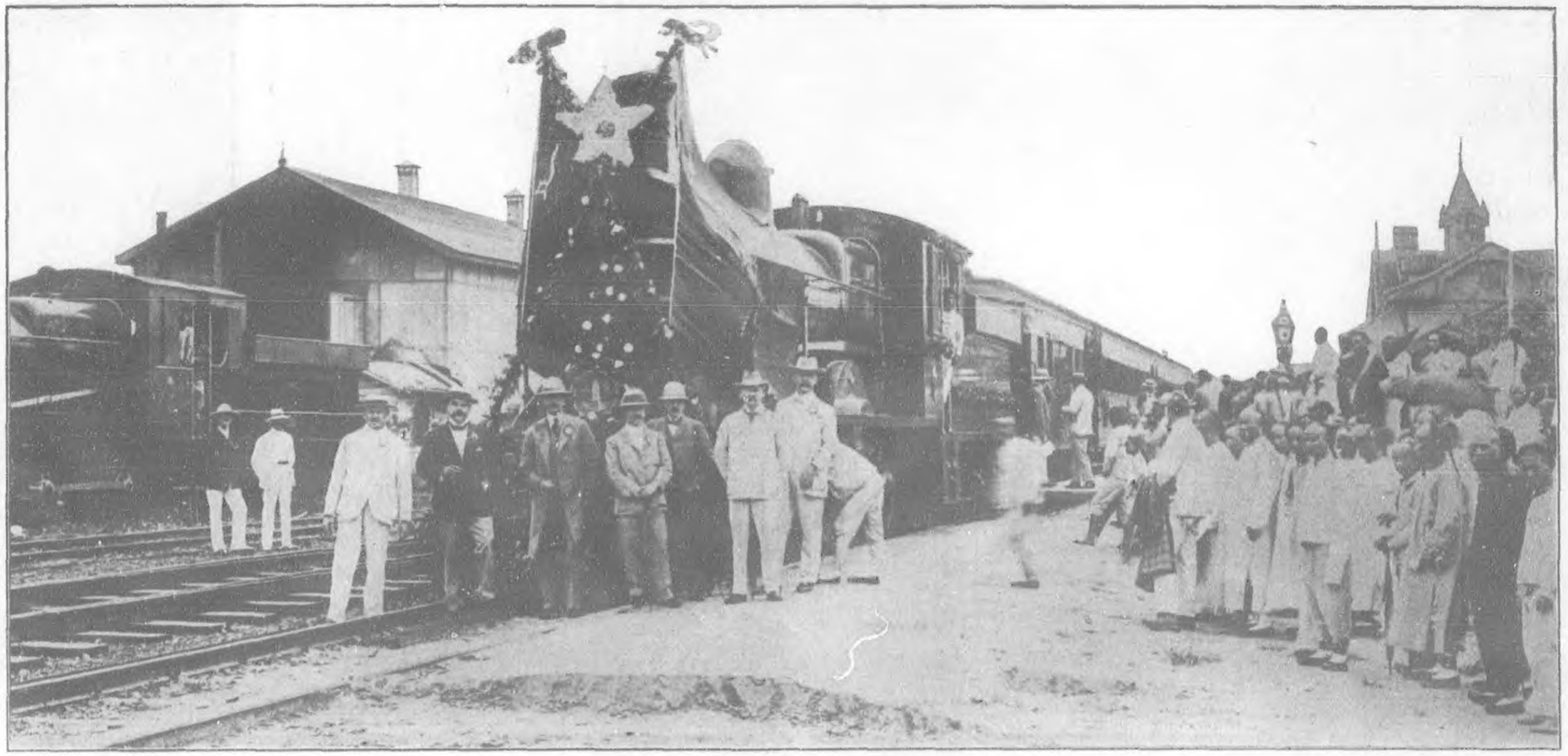
ROLLING STOCK.—The passenger locomotives are the 4-wheel-coupled type, and were built by Robert Stevenson & Co. of Darlington. The boilers contain 214 tubes of 2″ diameter, with a working pressure of 180 lbs. to the sq. in. The cylinders are 18″ with 26″ stroke. The diameter of the coupled wheels on tread is 6′7″, the front of the engine is carried on 4-wheel bogeys and have a diameter of 3′ 6″. The tender capacity is 3,500 galls. of water and 7 tons of coal, and in working order the locomotives just scale 105 tons. The freight locomotives are of practically the same capacities, but with six coupled wheels 4′ 9″ on the tread.

PASSENGER CARS.—The three classes of passenger cars are of the central-aisle type and accommodate 72 passengers in the 1st-class, 90 in the 2d-class, and 100 in the 3d-class. The coaches are divided by partitions, but are not composite. They are warmed with steam heat in the winter, but no extra provision is made for cooling in the summer beyond the ventilators in the roofs. The 1st-class coaches are comfortably upholstered and have a limited quantity of interior decoration. The new saloon coaches were expected to arrive in time for the inauguration of the Shanghai-Wusieh section, but the construction gangs got ahead of the home department. When they arrive they will be accompanied by handsome dining saloon cars 65′ long, together with kitchen cars, so that every convenience for refreshments for travelers will be provided. Sleeping cars will hardly be necessary, as Shanghai and Nanking will only be about 7 hrs. apart when trains are run through between these two points.

FARES ARE MODERATE.—The fares are extremely moderate—3d-class, 1 cent gold per mile; 2d-class, 1½ cent, and 1st-class, 3 cents. Even this low rate for the 3d-class may meet with a development, for it may occur to the officials that a 4th-class in the small hours of the morning, composed of freight cars, might be run to enable the small farmers to bring their daily produce to market. No doubt such an innovation would be well received and extensively patronized. The land being broken up into tiny holdings, the little farmer may be seen daily with his two huge baskets on the ends of his *bo*, on his way

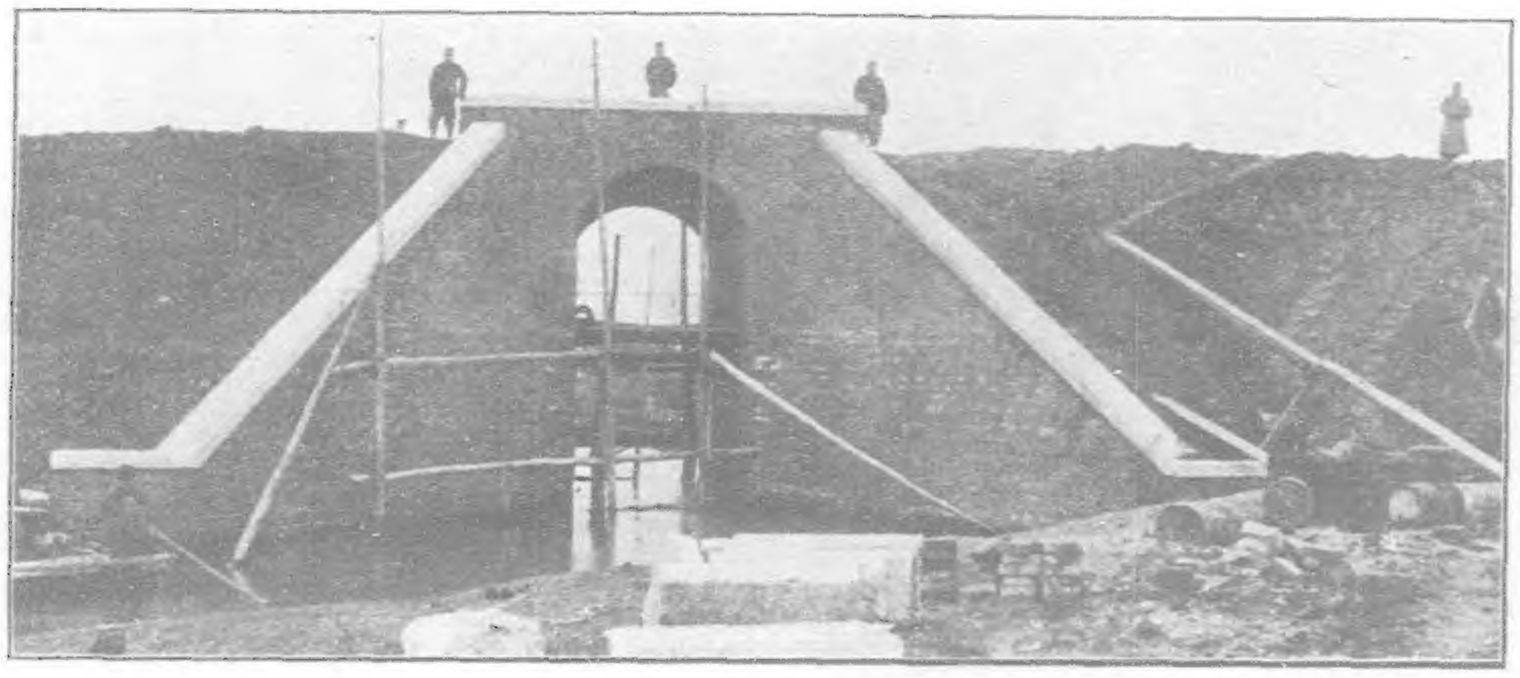


SHANGHAI-NANKING RAILWAY: CONSTRUCTING A COFFERDAM



OPENING OF THE SHANGHAI-NANKING RAILWAY

Locomotive "C 13" ready to start on the inaugural trip over the line from Shanghai. The gentlemen in front starting from the left are:—Mr. E. J. Dunstan, Locomotive Superintendent; Mr. A. H. Collinson, M. I. C. E., Engineer-in-Chief; Mr. Henry Keswick, of the British and Chinese Corporation, and Jardine, Matheson & Co.; Mr. J. D. Smart, of the Hongkong and Shanghai Banking Corporation; Mr. J. O. P. Bland, Secretary of the Shanghai Municipal Council; Sir Pelham L. Warren, K. C. M. G., British Consul General at Shanghai; and Mr. James McKie, of Messrs. Jardine, Matheson & Co.



SHANGHAI-NANKING RAILWAY: BRIDGE OVER A CREEK NEAR SOOCHOW

o the nearest market. This antiquated method of transportation is only feasible within a certain limited distance and probably the course suggested would meet with its reward in more ways than one.

FREIGHT CARS.—The freight cars are good, serviceable-looking constructions of the latest types. Those on steel 4-wheel bogeys have a capacity of 35 English tons. There are some smaller open 4-wheel cars carrying 18 tons, and a fine type of steel-covered car, also run on bogeys, with a carrying capacity of 30 tons.

The engineers and firemen are at present Europeans on all passenger trains, although natives are being trained and will supersede when they become practically efficient.

LABOR.—The laborers employed on the construction are entirely native, under British supervision. They have been drawn from all parts of the empire, and three and a small fraction may be taken as the equivalent of an English section hand. With wages, therefore, ranging from 15 cents gold for ordinary, and 25 cents for foremen and gangers, some idea of the comparative cost may be imagined. There have been no strikes thus far, and but few disputes. When it is remembered that two Chinese from 50 ms. apart can not speak the same dialect it says a good word for all parties concerned.

STATIONS.—The stations are on an average 6 ms. apart. They are built on one side of the line in the English fashion. The platforms are ballast-edged with stone coping, and are coach high. The offices and residences for the staff, who are all Chinese at the wayside stations, are handsome red and white brick structures of solid and comfortable appearance. It speaks well for the presumably peaceful intentions of the surrounding populace, and forms a considerable contrast to the stations on the Chinese Eastern Railway, each one with its fortified tower and wall. The platforms are long enough for any estimated traffic.

Shanghai station is awkwardly situated at a considerable distance from the center of the settlement. This is probably due to certain local causes at the conception of the enterprise, when the idea of any railway at all was far from being popular. It was also the terminus of the little line from Woosung, which was not a British concession. A more direct road than at present exists is in prospect, and possibly a branch of the electric railway will ultimately connect with it. The station has, however, ample sidings, engine houses, and sheds for cars. About ½ m. up the line an extensive locomotive roundhouse is in course of construction and at Markham-rd, about 1 m. out, ithe future freight depot is located. It has enormous sidings and stores, together with a magnificent wharf on Soochow Creek. This has been of the greatest use during the construction as by means of the creek the company's own lighters have been enabled to transport all sorts of machinery and materials to convenient spots, thus facilitating the construction simultaneously at various localities. Its immediate access to the river and sea will make this depot an ideal one. Probably, although there is no passenger station at present, the corporation will find it advisable to establish one at this point as it is less than a mile from the fashionable residential portion of Shanghai, and a road from it will tap the electric street railway line.

ENGINEERING STAFF.—The railway is being constructed under the supervision of the following engineering executive staff—A. H. Collinson, M. I. C. E., engineer-in-chief; A. C. Clear, Assoc. M. I. C. E., Soochow Division; F. Grove, M. I. C. E., Wusieh Division; J. G. Barkley, M. I. C. E, Chinkiang Division; M. R. Sinclair, M. I. C. E., Shanghai Division. Mr. Collinson is well known in connection with the Great Northern and London-Brighton systems of England and the Buenos Ayres Great Southern Railway in South America, and he was also employed for 10 yrs. on the construction of the Great Central Railway to London, from Annesley to Rugby.

JAPANESE CEMENT TRADE

Japanese cement, as an article for export, has not yet reached the status of the principal staple articles, its export being only half-a-million yen or thereabouts a year, but the "Chugai Shogyo" thinks there is no doubt, however, that the trade is on the eve of expansion, as the demand for Japanese cement will increase with the development of Korea, Manchuria, Russian territory and other Eastern countries. Nine years ago its export only amounted to 16,000 yen in value, but in 1903 it had increased to 590,000 yen. The war has put a temporary check to the growth of the industry, but with the restoration of peace a revival has taken place. Not only is the demand for Japanese cement springing up in Korea and Manchuria, but large orders received for San Francisco brought about since the earthquake and conflagration have given a great impetus to the cement industry in this country. All the stock in the market has been cleared and the cement companies are now busily engaged in manufacturing to meet requirements. The amount of cement exported during the last ten years is as follows:—

	Quantity. kin.	Value. Yen.
1896	2,322,644	25,372
1897	938,188	16,257
1898	2,108,686	36,955
1899	4,648,722	62,632
1900	15,088,419	194,469
1901	17,815,512	245,081
1902	22,840,563	308,349
1903	41,749,234	596,204
1904	39,085,471	548,497
1905	31,614,437	395,392

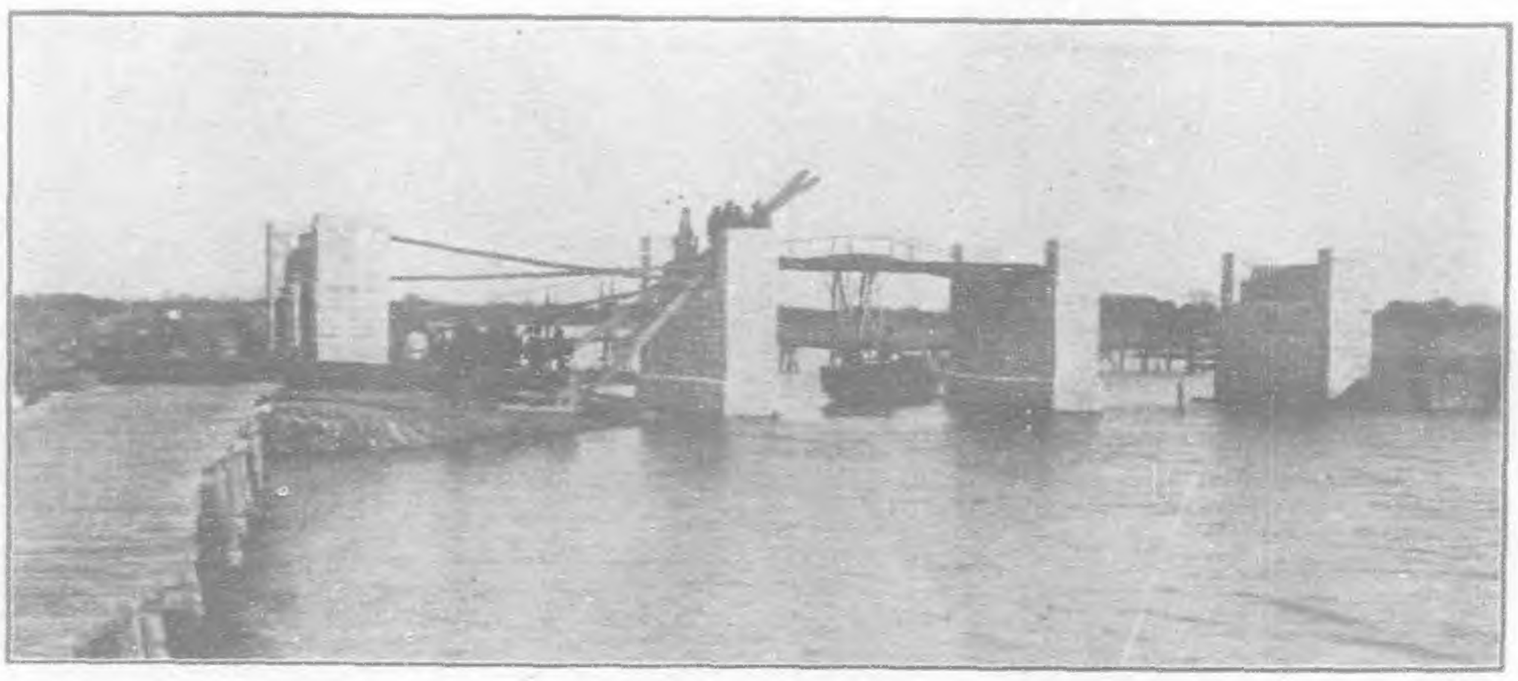
Up to the end of May this year the value of cement exported had reached over 423,000 yen, while the figures for the corresponding period of the two preceding years were 198,000 yen and 217,000 yen respectively. That is to say, the quantity exported during the first five months of this year exceeded that for the whole of last year. The principal countries to which cement was exported during the whole of 1905 and the first four months of this year are as under:—

	1905. kin.	1906. kin.
Korea	13,455,653	4,823,382
America	298,140	7,428,338
China	4 790,812	2,291,925
Manchuria	—	1,731,859
Dutch India	3,326	487,500
Russia	500	302,405
Philippines	4,133,287	300,080
Hongkong	988,440	90,000
Straits	60,000	56,000
Australia	28,728	28,728
Canada	7,755,771	—
Others	99,780	66,173

The remarkable increase in export to America that has taken place this year is doubtless owing to the unlooked-for event at San Francisco, while as to the gradual increase of export to Manchuria, Korea, and Asiatic Russia there seems to be little doubt. Next it will be interesting to review the amount of capital invested by the various cement companies and their annual producing capacity.

	Capital invested. Yen.	Producing capacity. Barrels.
Onoda	959,000	200,000
Osaka	333,000	90,000
Kyushu	280,000	30,000
Mikawa	110,100	40,000
Hokkaido	500,000	90,000
Nippon	510,000	90,000
Saga	341,000	50,000
Chuo	421,000	120,000
Aichi	403,000	120,000
Miye	168,000	30,000
Asano	800,000	200,000
Suzuki	110,000	40,000

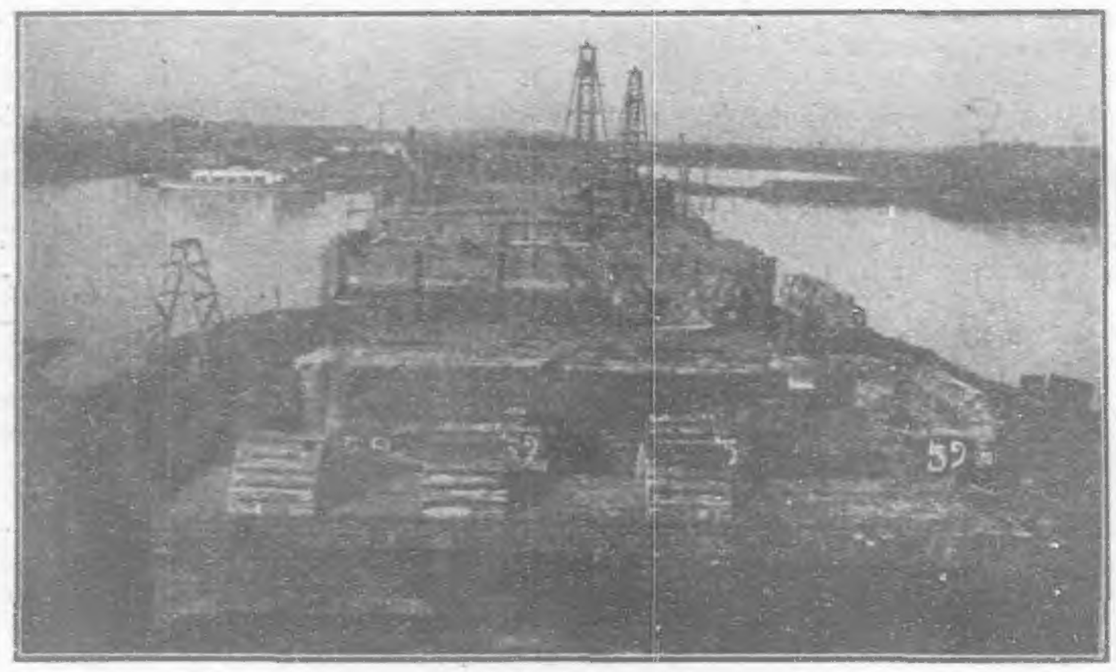
Of these it is only the Aichi cement which made a dividend of over 10 per cent for



SHANGHAI-NANKING RAILWAY: BRIDGING THE GRAND CANAL



BRIDGING A CREEK NEAR WUSIEH



QUINSAN VIADUCT

last year, while the majority had to content themselves with dividends of 5 per cent or less. In short, all the Japanese cement companies have hitherto been suffering under a disadvantage, but now a new stage of development seems to have opened up for the trade.

MACHINERY FOR MALAYA

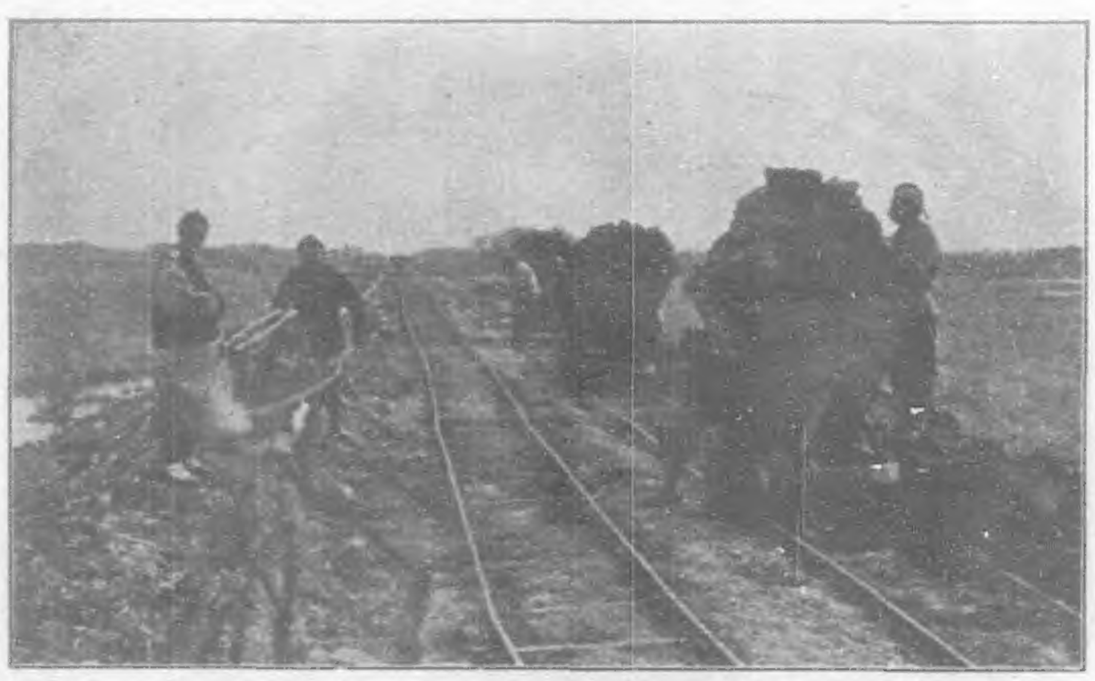
Writing to the *African World* Mr. Ralph Stokes of Tanjong Malin, Perak, says:—

Manufacturers of mining machinery would do well to take note of the growing requirements of the tin-mining industry of the Federated Malay States, which promises to rapidly develop into a valuable new field of business. In the past the producers of it—for the most part Chinamen—have employed large numbers of coolies, and utilized the simplest sluicing plant in their work, the pump and its engine often being the only items of mechanical equipment on their properties. Being also "towkays" or merchants, there has been method in this seeming madness, but, as in all mining fields robbed of their surface riches, the saving of the industry today depends on low-grade propositions, worked on a large basis and with labor-saving devices. At the present time several important schemes formulated on this principle are under weigh; if successful there will be a boom in highly mechanical systems, and even the conservative Chinaman will be prompted to negotiate with the makers of machinery rather than the recruiters of labor. At one property, named Tanjong Rambutan, a 16 in. suction dredge, constructed by the Austral-Otis Company, of Melbourne, is being installed to deal with a large body of low grade ore. At Redhills one may see a Bloudin conveyor, steam navvy, stamps, and new type of concentrating plant in course of erection. At Tronoh a new power installation is contemplated. At the Kampar property of the Société des Etains de Kinta a turbine to utilize a large fall of water will be at work early next year, generating up to 500 h. p.; and in many other sections of the country, Perak especially, engineering progress is manifest.

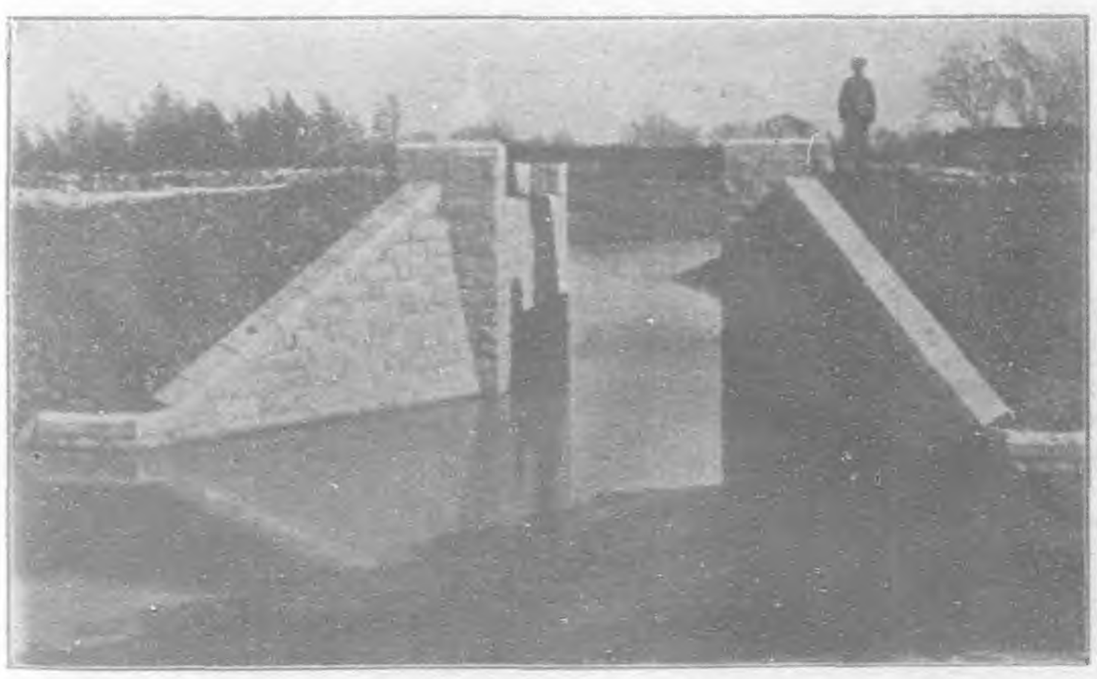
Mine labor is almost entirely Chinese; a fair percentage of Tamils are employed. The indolent Malay prefers fishing or grooming of horses. The cost of living has been greatly increased by the fixing of the dollar at 2s. 4d, and unskilled labor is not cheap, according to the Eastern Standard. The standard wage is 50 cents, or 1s. 2d., per day, with rice and accommodation. But the quality of the Chinese labor is exceptionally good. I have questioned many managers as to their views of this class of labor, and without a single exception they have told me that it is of the very best conceivable, and easy to handle. Those who have not been to South Africa refuse to acknowledge that the Kaffir can be a superior working factor. Those who do know the Rand—and several local engineers can be thus classified—affirm that the black assuredly is not a better workman. The China



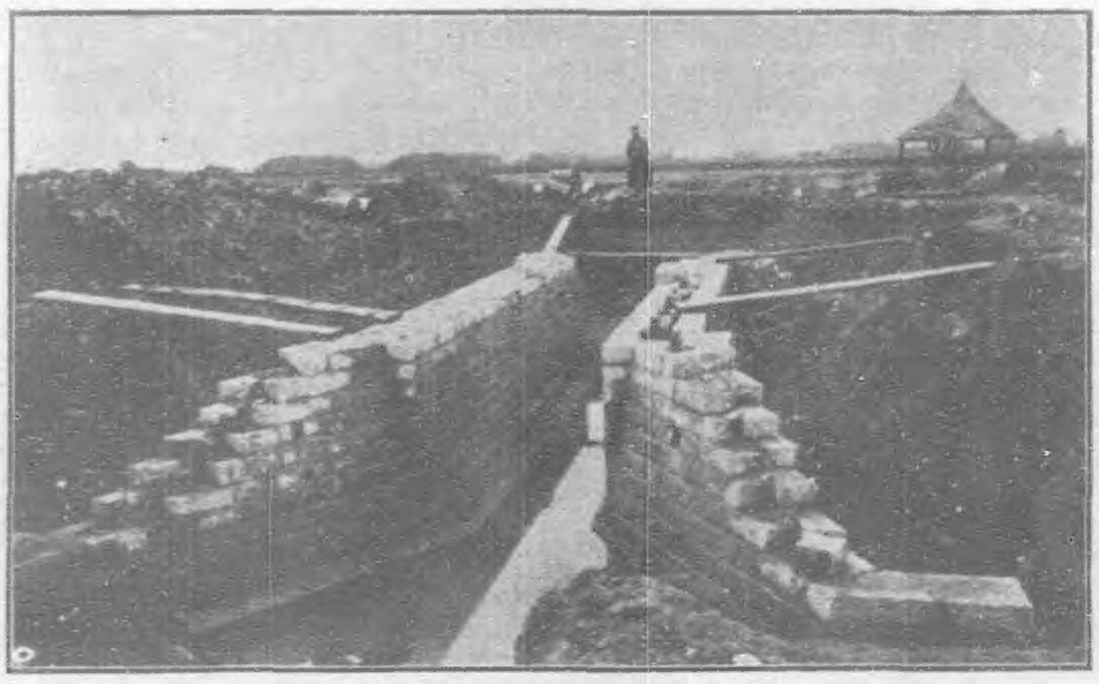
FOUNDATION FOR A CULVERT



CONSTRUCTION OF RAILWAY ACROSS A MARSH



TYPE OF CREEK BRIDGE



CULVERT UNDER CONSTRUCTION

man's chief defect (or virtue ?) is his extraordinary contempt for danger when engaged in underground or excavating work. The burying of a comrade by a fall of roof or slip of overburden appears quite a pleasant diversion in the day's monotonous round.

The coolies are put on contract work whereever practicable, experience having shown that the system is extremely economical.

Another fact that must hasten the general adoption of mechanical installations is that the Chinese immigration is now well-nigh at a standstill. The growth of prosperity in Southern China and the demands for labor set up by the new railways have resulted in diminishing the comparative attractions of foreign lands. These conditions are manifest to those concerned in Chinese affairs in Perak. So vast is China and so varied its populations, however, that generalisations concerning its labor supplies are clearly hard to advance, and the experience of this peninsula; although a Chinese colony, in all but administrative control, may prove deceptive as a formula for wider application.

PULAU LAUT

With regard to the rumours that Germany had obtained a coal station in the Netherlands-India possessions, viz., the island Laut, situated off the south-east of Borneo, it may be mentioned that some coal mines are worked there, which have produced of late large quantities. These mines belong to the Coal Company Pulau Laut, established in 1903 in this city (Amsterdam) the Director being Mr. P. Kolff, and Commissaries Mr. C. J. K. van Aalst, Mr. H. C. van der Honert, Mr. Aug. Jannsen, and Jonkheer H. Loudon. The capital of 5,000,000 guilders, as far as it has been issued, is nearly all taken up by the named gentlemen and the Netherlands Trading Company. In the early days of its existence the Company had to struggle with many difficulties, but since the coals fetch better prices, and the production increases, better times have arrived. The Company has constructed on the island a railway of 5 kilometres, by which the coals are carried from the mines to the vessels. There is such deep water that steamers with even the greatest draft can come into the harbor. The whole establishment is provided with electric light, while an electric loading engine is being constructed of great capacity. The coals can be produced cheaper at Pulau Laut than on the Ombilien coalfields because the mines are nearer to the sea. Lately the Company has concluded large coal contracts with foreign shipowners, of which the largest is the North German Lloyd. In consequence of this circumstance the German steamers regularly call at the named harbor, and this has given the impression that Germans had obtained a monopoly.

(London & China Express,)

IMPERIAL GERMAN CONSULATE, CANTON

The two fine blocks of buildings for the Imperial German Consulate which have recently reached completion on Shameen, says the *Canton Daily News*, are certainly the handsomest buildings here and an ornament to the bund. The front building which is the Consul's residence standing on the bund distinctly adds to the beauty of the settlement, being in accordance with the best traditions of its surroundings, and no expense and trouble have been spared to make the buildings beautiful and their occupants comfortable. The spacious verandahs around the whole building render the rooms delightfully cool. The chief entrance leads to the central hall, which is handsomely fixed and decorated. A dome, lighted with tinted glass, surmounting this central area leading in produces a very fine effect. All the entrance doors to the building are of stained glass displaying the German Eagle. A fine saloon 42 ft. long by 22 ft. wide occupies part of the front on the ground floor.

The offices of the Consul and his staff are situated at the rear on the ground floor, while a large spacious dining saloon is opposite the chief entrance. A teak wood staircase mounts from the Central Hall to the first floor, the decorations and balustrading from hall to dome being of carved teak wood. The first floor contains the private sitting, reception, sleeping and guest rooms of the Consul, all spacious, airy and tastefully decorated, and furnished. All the fittings in both buildings are of the best description, most of them having been imported from England. Messrs. Arnhold, Karberg and Co., who have supplied and fitted the electric installation, are to be congratulated on the taste and care with which their work has been carried out. The building situated on the central street of Shameen will be occupied by the interpreter Dr. Walter and Mrs. Walter, who dwell on the first-floor, and the Chancellor Mr. Lohmann and Mrs. Lohmann who reside on the second floor. On the ground floor there are the office of the Interpreter and his Chinese staff and the Imperial German Post Office. The building has been carried out to the designs and under the supervision of Mr. W. Danby, M.I.C.E., whose large and varied experience out here has resulted in the production of a handsome addition to the residences on Shameen.



NEW IMPERIAL GERMAN CONSULATE AT CANTON. W. DANBY, M. I. C. E., ARCHITECT

GOVERNMENT PURCHASE OF JAPANESE RAILWAYS

At a special Cabinet Council held in the latter part of July, the Government decided to purchase the following six railways, and in the afternoon communicated the decision to the parties concerned.

The railway belonging to the Hokkaido Colliery and Railway Company and Kobu Railway to be purchased on October 1, this year.

The Nippon Railway and Gan-netsu Railway to be purchased on November 1, this year.

The Sanyo Railway and Nishinari Railway to be purchased on December 1, this year.

According to a table of valuation of railways, which was distributed among the members of the Houses in the last session of the Diet, the above railways are valued as follows:—

THE NIPPON RAILWAY

	Yen.
Capital	50,451,800
Cost of construction	54,479,359
Estimated price of purchase	130,532,540

THE SANYO RAILWAY

Capital	32,799,700
Cost of construction	36,787,664
Estimated price of purchase	74,042,980

THE KOBU RAILWAY

Capital	3,265,000
Cost of construction	3,318,219
Estimated price of purchase	9,729,020

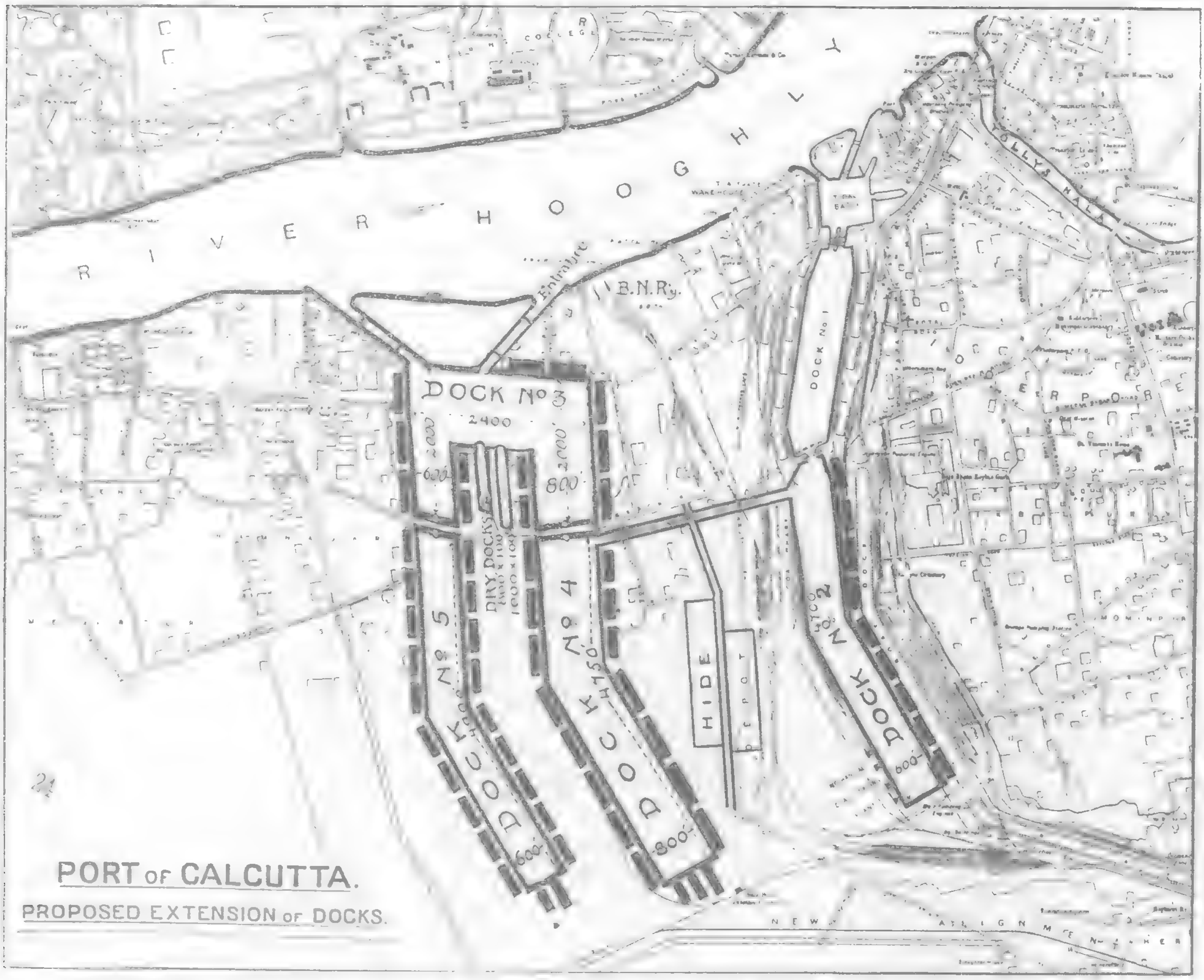
RAILWAY DEPT. OF THE HOKKAIDO COLLIERY AND RAILWAY COMPANY

Capital	12,936,800
Cost of construction	11,704,726
Estimated price of purchase	29,168,180

THE NISHINARI RAILWAY

Capital	1,650,000
Cost of construction	1,956,505
Estimated price of purchase	1,956,505

(Continued on page 135.)



CALCUTTA PORT IMPROVEMENTS

From "CAPITAL"

The plan which we publish as a Supplement in this issue illustrates the Port Commissioners' proposals for largely extending the accommodation for the trade and shipping of the port, and it is noteworthy that the ports of Calcutta and Liverpool should, so to speak, be simultaneously before the Government with proposals which are intended to cover the increase of trade extending over 30 years or more.

Many changes have been necessitated in the existing harbor works in consequence of the larger and larger steamers that are now employed in commerce. It is difficult to say what the limit of size will be, and when it will be reached. Steamers which were the largest ten years ago are now comparatively small boats. Therefore, the Port Commissioners of Calcutta are providing entrances sufficient for a steamer of 1000 ft. in length and beam of 100 ft., but the Liverpool authorities consider that a width of 130 ft. should be provided, and we shall probably find that when the detailed plans come to be considered, any alteration in the entrances will be in the way of making them wider than now proposed, for the plan now put forward is merely a preliminary scheme prepared, it is understood, with the object of illustrating what land must be taken up for the construction of docks on a scale sufficiently large to meet the rapidly increasing trade of the port.

The first work to be carried out in this great scheme is the completion of Dock No. 2, which will be 4,700 ft. long, 600 ft. wide, and have an area of 62 acres. On the east side there are to be 9 produce berths, 4 of which have just been sanctioned by the Government of India, and will at once be taken in hand. On the west side two mechanical coal loading berths are shewn, but the intention is to provide coal tipping appliances along the whole of the east side of the dock if the two to be first constructed should be as successful as is anticipated. This dock will give accommodation for 19 steamers of an average length of 500 ft., with ample water space for the free movement of vessels and for lighters bringing cargo to them.

The first of the new docks to be constructed will be No. 3 into which the two entrances already alluded to will give access from the river, one entrance pointing up stream and the other down stream so that the docking and undocking of vessels can be carried on at any state of the tide. The area of this dock will be 86½ acres, the greatest length 2,400 ft., and the greatest width 1,000 ft. Including the 4 riverside berths between the entrances this dock will provide 16 berths for vessels varying in size from 500 ft. to 650 ft. in length and a space is reserved for the construction of two very large Graving Docks. Dock No. 4, which is 4,750 ft. long, 800 ft. wide and 87 acres in area, will provide berths for 16 steamers varying from 500 to 700 ft. but actually steamers of any length may be berthed in it.

Dock No. 5, which is shewn as being 4,900 ft. long and 600 ft. wide, has an area of 67 acres and will have 20 berths for steamers of 500 to 600 ft. in length, but here, too, as in fact in all the docks, steamers of any length can be accommodated. The old and the new system of docks are linked up by a connecting channel adjoining docks Nos. 2 and 4, so that vessels from any one of the docks can be moved to any other dock without having to go out into the river. The total accommodation provides for no less than 62 berths with a quayage of 38,700 lineal feet in addition to the 21 berths and 11,400 lineal feet of quayage already existing.

The rail-borne traffic for docks of this magnitude must necessarily be very heavy and to provide ample space for dealing with this traffic, it is proposed to divert the E. B. S. Railway Co.'s Budge Budge branch 1,000 ft. further south, and, on the ground thus obtained, to put in at the east end receiving lines, in the central portion sorting lines, and in the western end standing sidings for the sorted traffic from which it can be distributed with the greatest facility to any of the berths.

Incidentally the carrying out of these works will result in low-lying swampy ground being raised to a good level, the sanitary condition of the locality being thus improved, while space is made available for business and even residential premises. The Commissioners in anticipation of this scheme have been quietly purchasing a large river frontage at Garden Reach, and are already in possession of more than half of the frontage land required.

The above is a brief description of the works, and we would add that they are an expansion of the present dock system and of the organization which has been carefully built up there on the experience gained of the specific requirements of the various sections of the trade, an organization capable of development concurrently with the growth of the trade under conditions which will afford the best working as well as the best financial results.

THE MANILA RAILWAY COMPANY



HORACE L. HIGGINS, GENERAL MANAGER, MANILA RAILWAY CO.

The Manila Railway Company, operating the only steam railway in the Philippines, between Manila and Dagupan, was organized in London in 1888. The concession for this road was secured from the Spanish Government for a term of 99 years dating from April, 1887, and during that period the Government guaranteed the interest, payable from the Philippine Treasury, of 8 per cent, on a capital of $4,964,000, which was subsequently increased to $5,373,700 from the extra cost of works authorized by the Government. The working expenses for the purpose of calculating the guarantee, was based on 50 per cent of the gross earnings. At the expiration of this concession the road was to revert to the State without compensation, and there was no option for the purchase by the Government at any time during the life of the franchise.

The Spanish Government regularly paid the guarantee, every there months up to 1897, but, on the change of sovereignty, the payments were stopped. The company, acting under the best legal advice, took the natural stand that, under international law, the United States assumed the obligations of Spain on the transfer of authority, while the American officials have contested the point.

This in addition to the claims of the Company for damages to their lines through insurrection, and for revenues while under control of the military amounting to $1,500,000 gold, has been a matter of diplomatic negotiation ever since, and was only settled on the signing of the recent contract for the new lines.

In 1903, the Company secured concessions from the Philippine Commission for the construction of three extensions to the man line, aggregating 87 miles, one to Camp Stotsenburg one to Cabanatuan, and the other to Antipolo. The Company as formerly organized had an authorized capital of $1,000,000 gold ordinary and $1,500,000 preference shares, with borrowing powers for $7,575,000. The headquarters are at 43 New Broad St., London, with the following Board of Directors:

C. J. C. Scott, (Chairman), A. von André, Admiral Sir C. A. G. Bridge, R. H. Bensen, R. Fleming and J. G. Le Marchant, Secretary, J. Mackenzie.

Two years ago, a controlling interest in the company was secured by Messrs. Speyer & Co., the well-known bankers of New York and London, and through this firm the negotiations with the government were carried out for the construction of the new roads.

The Hon. Cameron Forbes, in an article on the Railroads of the Islands, recently published in the anniversary number of the *Daily Bulletin*, has the following to say about the negotiations leading up to the new concessions:—

On June 20, 1905, Secretary Taft advertised proposals in Washington asking for bids for the construction of railways, and they were similarly advertised in Manila. The terms, which had been very carefully drawn under good advice, called for very good construction, early completion, and, in general, would have provided the Islands with an admirable system at an early date. There were eleven routes advertised, amounting in all to an aggregate of about 1,200 miles. The probable cost of construction of this number of miles was the extreme limit upon which the Government was authorized to guarantee bonds, as the bill provided that the amount of interest guaranteed could not exceed $1,200,000 a year. At the time these proposals were issued the Government had reason to believe that there would be at least three bids for the whole system.

On December 20, 1905, the bids were opened in Washington in the presence of the Secretary of War and Governor-General Wright. They were three in number, one for the whole of the island of Luzon, one for three of the Visayan islands, Panay, Negros, and Cebu, and one from a Seattle syndicate for the lines in southern Luzon in the provinces of Albay and Ambos Camarines.

These bids were none of them in accordance with the terms of the proposals, differing in the following respects:

The Speyer syndicate did not ask for a guaranty but made many requests for privileges which were of such a nature that the Government could not possibly be justified in acceding to them as they would have laid it open to the charge of having given away the rights of the people. These included permanent low taxation, permanent high rates without right to regulate, and permanent immunity from competition.

The Seattle syndicate did not deposit any check as guaranty, complying otherwise in every respect with the terms of the proposal.

The second call for bids was issued, to be opened on January 20, 1906. In the second call the following changes were made:

In the first place in regard to bids upon which guaranty was asked the amount of contractor's



MANILA RAILWAY CO. ERECTING STEEL BRIDGE ON ANTIPOLO RXTENSION



MANILA RAILWAY CO.—TEMPORARY BRIDGE OVER A GULCH



MANILA RAILWAY CO.—NEW STEEL BRIDGE WITH CONCRETE PILE



MANILA RAILWAY CO.—BRIDGE ON CALANATUAN EXTENSION. STEEL BRIDGE OVER MARIQUINA RIVER, ANTIPOLO EXTENSION



MANILA RAILWAY CO.—CONSTRUCTION TRAIN



MANILA RAILWAY CO.—NEW STEEL FREIGHT, SHEDS, MANILA

profit was increased as requested by the Visayan syndicate and the period of time during which surveys and construction could be made lengthened. Other changes of a minor nature were also made.

In regard to unguaranteed lines propositions were requested, no restrictions being placed except that they must comply with the terms of the law.

The Speyers this time offered two propositions, one of them for unguaranteed lines almost entirely as before, but eliminating some of the more objectionable features of their original proposition, and bidding in addition on a guaranteed line from Dagupan to Laoag, making in all some 400 miles of unguaranteed line, much of it short branches from the existing lines, and 160 miles of guaranteed line. Although modified so as to comply with the terms of the law yet the proposition of the Speyers still contained so many features that seemed objectionable that the award was withheld and negotiations entered into with them in the effort to have them so modify their demands as to make a proposition which the Government could be entirely justified in accepting.

After many months of negotiation this has at last been accomplished, Messrs. Speyer & Co. having reached an agreement with the Secretary of War, of the progress of which the Commission were kept cognizant and of which they entirely approve. In the course of these negotiations the plan to construct a guaranteed line from Dagupan to Laoag was abandoned and the result is that all of the lines in Luzon are upon one plan, namely, that of unguaranteed construction. On May 25, 1906, the following resolution was passed, formally awarding the concession to the Speyer syndicate and agreeing to pass an Act the terms of which had been agreed upon, word by word, by the parties interested, namely, The Philippine Government, the War Department, and the bankers

"WHEREAS, the Secretary of War and Vice-Governor Smith have reached an agreement with Messrs. Speyer and Company upon the terms of a concession for the construction of 428 miles, more or less, of railroad in the Island of Luzon, the construction and equipment of which they will agree to undertake; and

"WHEREAS, said agreement contained also a provision by which all of the railroad lines of the Manila Railway Company, Limited, whether built under the old Spanish grant or under concessions of the Philippine Commission will be transferred to a new company organized under the laws of one of the States of the United States and will be merged with the new system; and

"WHEREAS, said agreement further provides that all claims of the existing railroad against the Insular, provincial, or municipal



MANILA RAILWAY CO.—TEMPORARY WOODEN BRIDGE



MANILA RAILWAY CO.—ERECTING BRIDGE OVER SAN JUAN RIVER



MANILA RAILWAY CO.—ERECTING STEEL BRIDGES, CABANATUAN EXTENSION.



ANILA RAILWAY CO.—TRACK LAYING. ONSTRUCTION TRAIN BUILDING. CONCRETE PIER FOUNDATIONS.

ernments of the Philippine Islands and the nited States Government will be waived, and original Spanish grant and concessions by Philippine Commission for existing railroads l be terminated and merged in the new con- on; and

WHEREAS, it appears to the Commission it is in the public interest that railroads nstructed in Luzon at the earliest possible , and that the lines bid for are, on the whole, factory and the terms proposed are such the public interest will be properly pro- d if the same be accepted and approved; OW, THEREFORE, BE IT RESOLVED, the Commission hereby agrees to award to Messrs. Speyer and Company, of New York, a concession, the terms of which are to be the terms contained in the draft of a proposed Act copy of which is hereto attached, which provides for the construction and equipment of 428 miles, more or less, of railway in the Island of Luzon along the routes indicated in the attached draft and upon the terms therein set forth; and

"BE IT RESOLVED FURTHER, That in order that no time may be lost by the said company in making their arrangements to begin their surveys and other plans for early construction the Secretary of War is hereby authorized to give formal notice of such agreement to award; and

"BE IT RESOLVED FURTHER, That the Secretary of War be notified that, upon receipt of the name of the proposed railway company for which the concession is requested, the Commission will pass an Act in accordance with the terms of the accompanying draft, copy of which he now has in Washington."

The salient points in the Speyer's concession are as follows.

1. They agree to build 428 miles, more or less, of railroad throughout the Island of Luzon, including roughly 100 miles in Albay and Ambos Camarines, the line from Manila to Batangas and Lucena with branches, and several branches from the existing line of the Manila and Dagupan Railway, branching to the east and to the west, but principally to the east and including a line from Dagupan to San Fernando de la Union and a branch to the foot of the mountains within a few miles of Baguio.

2. No guaranty is asked on any of this construction.

3. While the rates are to be based on those now enjoyed by the Manila and Dagupan Railway the Government has the power to regulate them at any time.

4. The existing Manila and Dagupan Railway and all its branches give up their franchises, withdraw any claims which they may have against the municipal, provincial, or insular governments or the Government of the United States, and come in under the new charter on exactly the same basis at which the new lines go in.

5. The concession is a perpetual one.

6. There is nothing said in regard to competing lines, the Government being free to grant franchises for such lines at any time.

7. Taxation is one-half of one per cent of the gross earnings for thirty years; 1½ per cent for the ensuing fifty years, and thereafter to be fixed by the Government.

8. The company is given twelve months to complete its surveys and thereafter two years in which to complete the first 150 miles and agree to complete 75 miles each year thereafter. This does not compel particularly rapid action.

9. Right of entry of the material for the construction free of duty.

10. Privileges of using right of way 100 feet wide of the public domain, excepting always such part as is laid aside for public uses like parks, streets, etc., and such improved lands as the so-called Friars' Lands, etc., for which payment must be made.

11. Gauge to be three feet six inches and the quality of construction material to be up to first-rate modern standards with due regard to local conditions.

It will be seen that the public are to be amply protected by the above concession. Although



MANILA RAILWAY CO.—BRIDGE ON ANTIPOLO EXTENSION.



MANILA RAILWAY CO.—TEMPORARY BRIDGE. NEW STEEL FREIGHT SHEDS, MANILA.

the concession is a perpetual one the power of the Government to regulate rates and to grant franchises for competing lines assures the people of the Philippine Islands that industry cannot be choked either by exorbitant rates or by one railroad occupying the field and preventing any others from coming in. Others can be built whenever it seems advisable to so arrange.

In this enterprise the syndicate has a great advantage in the experience gained by the officers now in charge of the Manila Railway Company, Limited. Mr. Higgins is manager of this company and deserves a great deal of credit for the condition to which he has brought the property. In spite of light rails, the inexperience of native labor in railroad matters, the recent destruction during the insurrection, and the resultant depression in industrial conditions throughout the Islands he has succeeded in bringing his road-bed up to a very creditable condition and so maintains it. While the railroad is run on what seems to those used to American methods as a slow and cautious plan yet it is to be said to his credit that using wholly native engineers and conductors collisions are almost unknown, and the railroad is run as a profitable enterprise, continually building itself up which is the best criterion of good management. Mr. Higgins' wide experience, thorough training, and known ability are such as to be a guaranty that the work of construction about to be begun will be well and economically done.

TIES FOR PHILIPPINE RAILWAYS

A contract for the supply of one hundred and fifty thousand ties for the construction of the railroads in Panay, Negros, and Cebu has been awarded to Castle Brothers Wolf and Sons for the sum of 80 cents gold each. They will be imported from Australia, where a sufficient and immediate supply can be procured.

The Philippines Railway Company (J. G. White and Company) has also accepted a proposition of Macke and Chandler to furnish 1,500 ties of native hardwood. As far as can be learned this is the first lot of ties of native woods whose delivery has been arranged for.

In the course of a month or so a scheme for the cutting and delivery of ties by native woodsmen throughout the islands will be announced. The scheme contemplates direct dealings between the workman and the company. This is for the purpose of eliminating the "cacique" graft and giving the native who is willing to work a chance to make money by cutting ties in the forests. Arrangements are also to be made with the forestry bureau by which trees will be easier of access and the working in the woods more extensive than the regulations now allow.

SABANG BAY

FACTS ABOUT A GROWING COALING STATION

By Silas C. Penny

Such Oriental nomenclature as Singapore and Tandjong Pagar have been filling the columns of the home papers for many months, but, though casual attention was drawn to Sabang at the outbreak of the Russo-Japanese War, the promise and possibilities of Pulo Wey, the jewel of Acheen, have never been exploited by the itinerant scribe. And yet few of the earth's fledgling ports deserve an admiring chronicler more than this island coaling station. The subject is one of importance, not only from a local point of view, but also in a political sense; while the lover of beauty will find in the harbour a feast for his vision seldom met with even in the gorgeous East

Two years ago, the Straits Press discussed the possibilities of Sabang, and though it was half admitted that in time of war the station might prove a thorn in the side of Great Britain, the idea of it becoming a mercantile depot of any importance was scoffed at. While often afraid of Dutch competition, it is customary for the Britisher out East to regard Dutch enterprise through an inverted telescope. After a stay in Sabang for several days, and a careful study of such signs as may be accepted as

FINGER-POSTS TO THE FUTURE,

I consider that the value of Pulo Wey cannot be overestimated. It is strange that the last writhings of Mother Earth as she passed through her apprenticeship of fire, twisted the tortured hills into gaunt shapes, which, when covered with tropical verdure, have become the loveliest spots of a lovely world. It is Nature's compensation to Nature. North Sumatra, the bold forelands of barbarous Acheen, are unmistakably volcanic, and are correspondingly beautiful. One of the sweetest sights on this coast is to be found as the little steamboat *Sabangbaagi* bustles from Olehleh, on the mainland, to the island of Pulo Wey. By this route, therefore, let us visit the "Dutch Singapore." The *Sabangbaagi* carries a motley crew, motley passengers, and in the way of cargo everything conceivable—from corrugated iron to cornice poles, from Dutch generals to cows in calf. Like everything else in Sumatra, it is commanded by a courteous Dutchman and manned by real natives—Malays—of Sumatran breed. Everywhere this scheme is adopted, and both the scheme and the natives work. "Malays," mark ye, my friends of British Malaya, who allow your natives to be hustled into commercial obscurity by hordes of imported Chinese!

Behind us, as we drop away from

OLEHLEH (PRONOUNCE IT "OOLALAY"),

the scene is daintily picturesque, the mainland mainly mountainous, breaking into curious rocky islets to starboard. Beyond these lie the sombre sentinels of the Bengalen Passage—Pulo Bras and Pulo Nasi Besar—with their serrated skylines and sharp peaks cowled in cloud. Almost dead ahead loom the lofty heights of Pulo Wey—grey, forbidding, inhospitable. If only the islands smiled a little more, the scene might have the Mediterranean for its setting. Nearing Pulo Wey, we find that it is almost uninhabited—that its gaunt steeps are a virgin land, its heights clothed in a thick cloak of jungle. A few miles further, however, and the rocky outline breaks into a spacious bay, and on the wide, white beach is seen a solitary hut, which, according to the skipper's yarn, is the home of the exiled Princess of Acheen.

Pulo Wey in a gale of driving rain and racing thundercloud is a sight to stir the blood. There is something primeval in the passion of this narrow sea. Pulo Wey in its more humble moods, with its quiet shore coves and occasional huts, homes of the cocoanut collector—the inevitable Chinaman again!—is also well worth the seeing. Beach, sea and jungle form

A HORIZONTAL RAINBOW,

and for miles between the steamer and the shore schools of porpoises gambol, some even playing around the prow of our craft, outstripping it with ease. The first sign of Sabang is a new lighthouse on a green headland; then two other prongs of land jut into the scene, and suddenly we see a number of lighthouses. These three capes form a double guard for the port, while the two outer ones curve inwards, claw-like, and thus protect the peculiarly deep-watered basin.

A few minutes later a couple of Dutch warships, very spick and span with their white and gold dressings glittering in the brilliant sunshine, tell us we are entering the small, but much-talked of, harbour of Sabang. When we swing to anchor, we find ourselves in a saucer of the island heights, suggestive of a crater, an ocean ante-room of haunting beauty. The open sea is no longer to be seen. We might be floating on one of the mountain lakes of Switzerland, only the foliage on the steep slopes is tropical and the heat is intense. Lining the shore are several dapper piers and wharfs, with a tangle of huge apparatus for coaling ships, large and small, a floating dock, and line upon line of long, low, iron-roofed offices, warehouses, and coalsheds.

A DIN OF MUCH WORKING

greets our ears. One warship is having her funnel repaired, the band of another is strenuously at practice, the colossal electric transporters moan as they toil, a noise as of distant thunder comes from the hull of the Liverpool steamer as she coals, while one or two Dutch cargo boats are fussily disgorging mysterious cargoes.

The houses of the station are built mainly on the further uplands of bay where the hills are less formidable, and there, too, flies the trusty old flag of Holland. Up there, also, where the island breezes blow unhindered, and the view of the bay is magnificent, stands a new and comfortable hotel, cosmopolitan enough to have an English billiard table, Bass's beer, and the *Sketch* in its reading-room. And the first words we hear on landing are those of a British captain thanking the manager of the Sabang Bay Harbour and Coal Company, Limited, for the surprising manner in which he had been

able to enter the port free of all charges, coal up, and get away within three hours of rounding the Oedjong Perimpuan. Directly afterwards we hear French, German, and, of course, Dutch spoken around us.

A PORT THAT AS AN INFANT

can be sucessfully cosmopolitan, and especially one that can attract British ships by the score, is in a fair way to attain permanent prosperity. The town is as well planned and ordered by the authorities as its sorroundings are by Nature. Six years ago it was a mere village, almost unheard of; to-day it is the pride of Sumatra, and the envy of half-a-dozen Governments.

Pulo Wey is eight miles in length and eight in breadth, with two bays, Pria Laoet and Sabang Bay on the north, and Balohan Bay on the south-east coast. Sabang Bay is completely sheltered against wind and sea throughout the whole of the year, while the other bays on the island are too deep near to the shore, and are not, therefore, always desirable. Fresh water is to be had *ad libitum*: indeed, mysteriously enough, two large fresh water lakes are perched a hundred feet above the Bay, and these reservoirs are fed by many rivers. Mountain breezes are generally coquetting with the confined bay, but when these are absent the heat of the hill-encircled harbour is intense. Mosquitoes swarm in their millions, but though you will find ten there to one in Singapore, they are of

A BENEVOLENT VARIETY AND SELDOM BITE.

Malaria is not unknown, of course, and the inhabitants fear the influence of the west monsoon, but generally speaking the Island is healthy and is particularly so for a beauty spot so typically tropical.

Even a Thames bargeman could make Sabang without a pilot. Within a few feet of the shore there is deep water, and there is no bar. The average depth of both entrance and harbour is about 20 fathoms. A pilot is provided by the Company mentioned above, but his assistance is not considered necessary by most skippers who have visited the station once. The entrance is about 2,460 ft. wide, and a Norwegian timber schooner, with her rudder jammed, ought to hit that. Sabang is just as easy to make at night as by day; a white light gleams out from the south-west side on Pulo Klas, and a red one from the opposite headland. There is a clear anchorage of 1,500 metres long by 500 metres broad, and the harbour will safely accommodate

BETWEEN TWENTY AND THIRTY BATTLESHIPS WITHOUT INTERFERING WITH TRAFFIC.

The bottom, being a combination of sand and coral, affords excellent anchorage. In addition to the harbour proper, hidden behind the island named Klas, on which the south-western lighthouse stands, is another anchorage, which may be gained by vessels not drawing more than 22 ft.—an ideal snuggery for torpedo craft.

Excepting the abundant military, the present and future of Pulo Wey seem to be in the hands of the Sabang Bay Harbour and Coal Company, and very excellent hands they are too. The manager is known amongst the inhabitants as

THE "KING OF THE ISLAND,"

and in spite of getting through an amount of work that would kill the average European in a month, he is a genial personage whom every skipper likes. The Company are monopolists, and provide the exception to the rule that monopolies are brakes upon the wheel of progress. The company employ many Europeans, who frequently work 10, 12 and 14 hours a day and business is becoming so brisk that the manager is crying for more and still more men. The Company's settlement is a large one. They possess some 1,000 ft. of wharfage, the long line of coal sheds alone are lettered from A to Z, there are 25,000 sq. ft. of storage room, workshops and offices, hotel, bungalows, coolie lines, a hospital, an ice manufactory, and a signal station. The

HUGE ELECTRIC TRANSPORTERS,

standing high above the village of coal sheds, are the most striking feature of the Company's settlement. They are of a most modern pattern, admirably adapted for the rapid work required of them. The same may be said of the floating dock, workshop and slip. The first-named, which occupies a sheltered position behind Udjong Perimpuan, is built for vessels of about 3,000 tons displacement and up to 360 ft. in length, and when docking they may draw up to 18 ft. The Company undertake all ordinary engineering repairs, and their charges for such work and for dock hire are the reverse of exorbitant. An American skipper was heard to exclaim, "Wal, I reckon that's the slippiest bit of coal humping I've seen outside the States. Didn't charge me any dues, and bunkered me right up inside two hours. Guess I'm quitting calling Dutchmen slow after this." And such seems to be the opinion of most captains who have had occasion to replenish their stock of fuel at Sabang. The Company boast that they have established records in coaling, and that they possess

"THE ONLY UP-TO-DATE EQUIPMENT IN THE FAR EAST."

Generally speaking, between 30,000 and 40,000 tons of coal are kept in stock at Sabang, and these are principally Welsh, Bengal, Japan, and Sumatran. The Company are favouring the Bengalese variety as giving better all round satisfaction to shipmasters. Only the best Japanese are used. The Netherlands Indian brands, though chiefly supplied to Government steamers and vessels of the coastwise trade, are by no means to be despised.

The Company have been able to attain their reputation for quick despatch by introducing the finest apparatus for the work yet invented. The four electrically-driven transporters, each weighing over a hundred tons, swing from shed to ship iron buckets containing 25 cwts. of coal each, and these giant feeders toil on both day and night. In addition to these machines, many hundreds of Chinese coolies and Port Said trimmers assist in bunkering. By day or night the Company can supply coals to a vessel at the rate of 100 tons an hour.

"Yes, if every you English cut a canal through the Peninsula above Penang, as you were once talking of doing," said the manager in the course of an interview, "then Sabang will

BECOME ONE OF THE FIRST COALING STATIONS IN THE WORLD."

"Doesn't it promise to grow into that now?"

"I believe so. We are working hard enough for it, and the fact that ships can always rely upon an adequate stock here, that when calling for bunker they are exempt from any charges whatever, must naturally go a long way to attract owners and masters to Sabang."

"The geographical position seems to be excellent?"

"It is. Steamers for the Far East via the Cape find Sabang particularly advantageous. They save considerable time in coming this way instead of by the Straits of Sunda. During the South-West Monsoon, steamers leaving the Straits of Malacca can fill up their bunkers at Sabang, and take the southern route to Cape Guardafui, thus being enabled to continue their voyage to Aden or Perim direct, or, as the case may be, to Suez or Port Said. Sabang is also the nearest coaling port between the Burmese rice ports and Japan."

It may be added that as a transhipment harbour Sabang's chief advantages are in that its storage rent and transhipment charges are less than those of neighbouring ports, and that other than these tariffs there are no import or export dues, no formalities, and no harbour dues, or for pilotage or lighterage. There is a fortnightly mail direct to Europe of the fine line of the Stoomvaart-Maatschappij "Nederland," which takes in enormous cargoes of tobacco from Sabang; and almost daily communication with Penang, Singapore, Batavia, Deli, and the west coast of Sumatra. —*Syren and Shipping*.

MEAT INSPECTION

EXTRACTS FROM REPORTS OF THE NATIONAL MANUFACTURERS' ASSOCIATION AND INSPECTOR HEDRICK, SANITARY INSPECTOR OF CHICAGO.

Our investigation of the Canned and Potted Meat part of the packing industry showed that the methods used make the use of preservatives unnecessary, and indicated that no preservatives or artificial coloring is now used by the canned meat packer.

The meat is first partially cooked in large kettles, then the fat and bone is trimmed off and the meat packed into tins. The air is then withdrawn with vacuum pumps and the cans sealed in vacuum. Next they are put into large cookers where the cooking process is finished. In the packing of some products it is necessary that the cans be re-opened and the steam allowed to escape, the vent hole being immediately resealed while the goods are hot, so as to retain the vacuum.

The entire process is quite similar to that used by the family cook when putting up fruits and vegetables, except that meats are sealed in tin cans instead of being put in glass jars. We found that the solder in making the cans and in sealing them is all placed on the outside of the can and does not come in contact with the contents.

We were informed that much of the cause for complaint in canned meats was because of the mistaken idea that the goods would keep in perfect condition after they had been opened. This would be the fact if they were preserved with chemicals, but as they are only kept in condition because of being sealed in vacuum tins they spoil just as readily as fresh meats do after they have been opened and exposed to the air, but will keep indefinitely if the can is not punctured. It is also a well known scientific fact that decaying meat generates a gas which will explode any package which is hermetically sealed.

Sanitary Inspector Hedrick submitted to Commissioner Whalen his analysis of conditions in the Libby, McNeill & Libby plant. He found, "with reference to general conditions, that the floors, halls, stairs, tables, etc., are kept clean" and "that the entire department—viewed from our standpoint—was in a satisfactory condition. All workrooms are light, and have good ventilation.

ORIENTAL CONSTRUCTION COMPANY, LTD.

The Oriental Construction Company, Ltd., which has had a nominal office in Manila since January 1st, will begin active business here on or about September 1st. This company will be represented in the Philippines by a competent engineer, and besides undertaking all kinds of general construction work it will make a specialty of professional engineering in all its branches.

NEW FIBER MACHINE

The Atienza hemp cleaning machine, the invention of a Franciscan Padre of that name, has been placed on the market for sale by the Atienza Hemp Stripping Machine company which has had a lot of the machines constructed.

Those who have had the opportunity of seeing this machine at work and have been able to give expert opinion on the subject, declare that the little instrument is bound to work a great change in the methods now in vogue for the stripping of abacá fiber.

The new machine weighs only 20 pounds and will clean six classes of hemp and will produce in one day 30 pounds of fiber making a saving in fiber of at least 25 per cent over the old time method. The price of the machine, ₱60, brings it well within the reach of all, even the humbler cultivators of abacá.

Padre Atienza is a Franciscan parish priest who has spent many years among the hemp growers in the south of Luzon. The first machine or hemp cleaning knife invented for the stripping of abacá was also an invention of a Franciscan parish priest.



Photograph by Worcester. MAGUEY FIELD IN NORTHERN LUZON

THE CULTIVATION OF MAGUEY IN THE PHILIPPINE ISLANDS

By H. T. EDWARDS, Fiber Expert to Bureau of Agriculture.

INTRODUCTION.

The essential feature of the maguey industry and that which recommends it to the Philippine planter is its peculiar adaptability to the conditions prevailing in many parts of these Islands.

These conditions are: A long dry season; large areas of arid, impoverished land; a limited supply of draft animals; the prevalence of insect pests and plant diseases; labor that is unaccustomed to the care of crops requiring intensive cultivation; and insufficient capital for the purchase of animals, implements, and machinery. In the cultivation of maguey we meet these conditions with a plant that grows and flourishes through the longest periods of drought; that requires for its best development a thin, rocky, limestone, or coral soil, and which can be grown in beach sand; that can be produced, on small farms, without the use of a single animal; that is not seriously injured by any insect or plant disease; that needs only a yearly,



Photograph by Dewey. SISAL HEMP, HAWAIIAN VARIETY



SISAL FIELD IN YUCATAN, SHOWING SYSTEM OF PLANTING IN ROWS

or semiyearly, cultivation; and that can, if necessary, be planted, cared for, and harvested with a "bolo."

The maguey plant of the Philippine Islands, the fiber of which is known in Great Britain as Manila aloe and in the United States as Philippine maguey, and the henequin plant of Yucatan, which produces the sisal hemp of commerce, are closely allied species of the genus *Agave*. These two plants have the same habits of growth and are propagated and cultivated by the same methods. The fiber-extracting machines that are used for sisal can be used, also, for maguey.

The production of sisal hemp has, within a comparatively few years, made Yucatan one of the richest States in the Republic of Mexico. The wonderful development of this industry is indicated by the imports of sisal hemp into the United States which were, in 1894, 48,468 tons, valued at $3,742,073; and, in 1904, 109,214 tons, valued $15,935,555, an increase in value of 328 per cent in ten years. The Philippine maguey industry, although on a much smaller scale, shows an equally encouraging growth. The export of maguey fiber from the Philippine Islands for the year 1901 was 875 tons, while for the fiscal year 1905 it was 1,878 tons, an increase of 115 per cent in four years.

This remarkable increase in the production of maguey has been effected in two different ways. The failure of other crops because of drought, insect attacks, or the scarcity of animals has led many Philippine planters first to investigate, and then to plant, maguey. The introduction of a modern fiber-extracting machine in Ilocos Norte has stimulated the industry throughout that province.

The establishment of this industry on a thoroughly satisfactory basis in the Philippine Islands requires three definite lines of improvement: First, *an improved system of planting*. It is the almost universal custom of Philippine planters to set out maguey plants but 2 or 3 feet apart. On the Yucatan sisal plantations it has been thoroughly demonstrated that planting in rows 12 feet



HARVESTING SISAL, SHOWING CORRECT METHOD OF CUTTING THE LEAVES



Photograph by Worcester. HARVESTING MAGUEY

apart, with plants 4½ feet apart in the row, will give more fiber per acre and fiber of better quality than where the plants are set out closer together. Second, *an improved system of cutting the leaves.* The Philippine planter frequently commences cutting when the plants are but one or two and a half years old. Following this first premature cutting, each year the plant is denuded of all but a few leaves. This system results in a weakened and stunted plant, and a considerable part of the immature leaves thus harvested contain but little fiber. The Yucatan system of cutting at one time only the mature leaves around the base of the plant keeps the plant always in vigorous condition, and gives more and better fiber. Third, *the use of fiber-extracting machines.* The Philippine method of retting is slow, expensive, and results in the production of inferior fiber. On all of the larger sisal plantations fiber-extracting machines are now used.

With the more careful selection of suckers for planting, a better system of cultivation, and more judicious cropping, it is only reasonable to expect that the maguey plant which we now have can be improved. Furthermore, the true sisal plant, *Agave rigida sisalana*, which has been imported from Hawaii and is now being grown in the Philippine Islands, gives promise of satisfactory results. The machine question is not a difficult one, as the machines required have already been perfected after long years of trial on the sisal plantations of Yucatan The wide distribution of maguey throughout the Islands, and the very general interest that is now being shown in this plant, will greatly facilitate the development of the industry.

HISTORY AND DISTRIBUTION OF MAGUEY.

The fiber of the henequin, or sisal hemp, plant has been utilized in Yucatan for centuries, but only within comparatively recent years has it become an article of commercial importance. The industry is supposed to have been started in Yucatan by the Toltecs about A. D. 1016. In 1783 a commission appointed by the royal Spanish navy investigated this fiber and reported favorably concerning it. In 1839 an association was formed in Yucatan to promote the cultivation of henequin, but, owing to the fact that at this time all of the fiber produced was extracted by the use of crude, wooden implements, the industry was not a profitable one. Realizing the need of a fiber-extracting machine for henequin, the State government offered a reward of $10,000, Mexican, to the inventor of a satisfactory machine. This offer resulted in the invention of the "raspador," from which have come the improved, automatic machines that have made the sisal industry what it is to-day. In 1875 the total export of sisal hemp from Yucatan was valued at $710,124, Mexican. In 1900 it had increased to $22,616,032, and in 1904 it was $32,022,563.

From Yucatan, sisal hemp has been introduced into Florida, the Bahama Islands, the Caicos Islands, Mauritius, the Hawaiian Islands, Cape Colony and Natal, West Africa, Australia, and India. In the Bahamas the sisal industry has attained considerable proportions and is now firmly established. The exports of sisal from the Bahamas are now valued at about $200,000 per annum. In Hawaii 20,000 sisal plants were imported by the commissioner of agriculture and forestry in 1893. Some years later the Hawaiian Fiber Company was formed and it now has 850 acres of sisal under cultivation. It was estimated in 1903 that fully 10,000 acres of sisal had then been planted in Hawaii.

DISTRIBUTION OF MAGUEY IN THE PHILIPPINE ISLANDS.

The maguey plant was probably first introduced into the Philippine Islands from Mexico. It is now known, and is utilized for local purposes, in nearly every province of the Archipelago. Until quite recently the production of maguey as an article of export has been confined to the Provinces of Ilocos Sur and Ilocos Norte. During the past three years, however, many planters in other provinces and islands have given their attention to maguey, so that to-day the industry has obtained a foothold in a number of provinces. The provincial governor of Cagayan has recently reported that 263 hectares of land in that province are now planted in maguey. The provincial governor of Batangas states that in the one town of Nasugbu there are now 6,000,000 maguey plants. From the Provinces of Union, Pangasinan, and Zambales, and from the Islands of Cebu and Negros reports have been received which show that the maguey industry in these districts has passed beyond the experimental stage.

THE PLANT.

The henequin of Yucatan, *Agave rigida elongata;* the sisal of Hawaii, *Agave rigida sisalana;* and the maguey of the Philippine Islands, recently identified at the Royal Botanic Gardens, Kew, as *Agave cantula*, are very similar plants. All have the short, thick stem; the aloe-like cluster of large, fleshy leaves; and the tall flower stalk, or "pole," which bears a large number of small bulbils, or pole plants. The Hawaiian plant differs from that of Yucatan in having a shorter trunk; leaves smooth-edged, or bearing a few unequal teeth; and the fiber less in quantity, but superior in quality. The Philippine maguey plant has a short trunk; leave from 4 to 6 feet long, from 2¾ inches wide at the base to 4 inches wide at the middle, and about 1 inch thick at the base; lateral teeth three-fourths to 1¼ inches apart; dark-brown terminal spine one-half inch long; and fiber finer, white, and longer, but less in quantity than either the Yucatan or the Hawaiian varieties.

THE FIBER.

The fiber of maguey is derived from the leaves, and is obtained by separating the pulpy portion of the leaf from the fine filaments, or fibro-vascular bundles, which run through this pulp. The fiber is white, or yellowish-white, in color, 4 to 5 feet in length, fine and soft, and more wavy or fluffy than abacá. Another marked quality is its elasticity, which gives it great value when used for cordage that is liable to be subjected to any sudden strain. In strength it is inferior to abacá, but superior to coir, jute, sunn hemp, and Russian hemp.

CLIMATE AND SOIL.

Maguey, if planted in a well-drained soil, will grow in almost any part of the Philippine Islands. Unlike abacá, it requires neither a large, nor a continuous supply of moisture, but rather an excess of hot, dry weather. It is evident, therefore, that the provinces best adapted to the cultivation of maguey are those where there is a long dry season and a light rainfall. With an abundant supply of atmospheric moisture and a rich, moist soil this plant will grow and flourish, but under these conditions the leaves develop a large amount of pulp and small percentage of fiber.

A thin, rocky, limestone soil, or one made up of partly decomposed coral rock, is best suited for maguey. As the roots of the plant are very sensitive to an excess of moisture, it is most essential that the soil be well drained. Although maguey is frequently found growing in almost pure beach sand, the conditions under which the plant can be most profitably cultivated are indicated by the following statement relative to sisal hemp cultivation in the Bahama Islands:

I have both read and heard it broadly asserted that sisal will grow and flourish anywhere, no matter how sterile or impoverished the land may be. My observations, however, do not confirm this. I do not mean to convey the idea that *really good rich land* is necessary for its successful cultivation, but merely to remove the impression, if such there be, that the plant will thrive in dry arid sand, or on rocky land void of soil. Worn-out "provision" and pineapple fields appear to be well suited to its cultivation, while on broken, rocky surfaces, containing innumerable "pot holes" and crevices, in which is deposited the ordinary black or red earth, the plant luxuriates. (Bulletin Royal Kew Gardens, London, 1892.)

THE PLANTATION.

The use of fiber-extracting machines in the Philippine Islands introduces a new and important factor in the maguey industry. Heretofore the Ilocos planters have usually grown maguey in connection with other crops. Rice and corn have been planted on the lowlands where there is an abundant supply of water, and maguey in small "patches" on the rocky hillsides and on any available waste land that could not be used for other purposes. There has been no demand for a large, or for a regular, supply of leaves in any one locality. It has, in fact, been impracticable for any one planter to handle satisfactorily the output of a large plantation. This situation is exactly reversed when a plantation, or a community, is equipped with a fiber-extracting machine. As one improved automatic machine will clean from 50,000 to 150,000 leaves per day, the continuous and profitable operation of such a machine requires a supply of leaves that can only be produced on one large plantation, or on several smaller plantations in close proximity to each other. Even with one of the smaller machines cleaning from 10,000 to 15,000 leaves per day, the planter will be able to handle a far greater number of leaves than has been possible where the fiber has been cleaned by retting. While it is not to be expected that the old method of cleaning fiber will be immediately, or entirely, superseded by the use of automatic fiber-cleaning machines, the more general use of such machines in the Philippine Islands is only a question of time, and with their use will come the establishment of larger and more systematically managed plantations.

A maguey plantation to be economically and profitably worked should consist of a fairly large area and should be reasonably level, so that all parts of it can be reached by good roads. The location having been selected and the boundary lines carefully located, the plantation should be mapped and laid out in fields or sections. The maguey planter has always to consider the question of transportation. Maguey leaves should be cleaned within twenty-four hours after cutting, and as every picul of fiber produced means the hauling of approximately two tons of green leaves from the field to the machine, and as the operation of one of the large machines requires from 40 to 100 tons of leaves per day, the need of having both cheap and quick transportation is apparent. With this end in view, the site selected for the fiver extractor, the baling press, and the storage sheds for fiber should be as centrally located as possible. From this point a main road, or roads, sufficiently wide to allow the use of wagons and also a portable track for cars, should extend through the plantation. Cross roads may be about 200 feet apart.

One of the first things to be done on a newly established plantation is to start a nursery where a supply of plants can be propagated from bulbs or pole plants. Even though suckers may be available and cheap, a good nursery will more than pay for the cost and trouble of its maintenance. Two or three acres of good well-drained land may be selected for this purpose, and this land should be thoroughly plowed and harrowed. The bulbs, which can be secured in quantity from any old plantation, are planted in rows 18 inches apart and 9 inches in the row. In one year the nursery plants should be from 15 to 18 inches high, when they may be transplanted to the field.

PROPAGATION.

Maguey is propagated in two ways, from the small "pole" plants, or bulbils, that are produced on the flower stalk, and from the suckers which grow from the roots of the older plants. When a maguey plant reaches maturity it throws up a tall flower stalk 15 or 20 feet high. On the lateral arms of this flower stalk are born a large number of blossoms and from these blossoms develop small plants 2 to 4 inches in length. These plants fall to the ground when mature, and may then be gathered and set out in the nursery.

The second, and more common, method of propagation, is by the use of the suckers which grow from the roots of the older plants. When a maguey plant is from twelve to eighteen months old it commences to throw out underground runners, or rhizomes. The point of one of these runners, upon reaching the surface of the ground, forms a sucker, or shoot. From 30 to 40 suckers will be produced by one plant during the first three or four years of its life, after which the number decreases. Where it is possible to obtain suckers cheaply, and in sufficient quantity, this method of propagation is quicker and more satisfactory than the growing of plants from bulbils.

FIELD PLANTING.

Where arid, rocky land is used for maguey there is usually but little preliminary clearing required. Any underbrush, or other growth, should be cut and burned during the dry season. As maguey feeds heavily upon potash, the ash that is left from this refuse will furnish valuable fertilizing material. The land, having been cleared, may be quickly lined out for planting by using two poles the length that the rows are to be apart, and a line, knotted at the distance apart which the plants are to be set. If the land is not of such a rocky character as to make plowing impracticable, it is well to plow several furrows along the line of each row of plants. Where other crops are to be grown with maguey the entire field should be plowed.

The suckers that are to be used for planting may either be taken from the old fields and set out at once in the new plantation, or they may be thrown in heaps and allow to lie in the sun for six or eight weeks. The latter method is very generally followed on the



Photograph by Worcester. CLEANING MAGUEY BY "RETTING."



Photograph by Worcester.

MAGUEY FIELD. (THE RESULTS OF OVERCROPPING.)

Yucatan sisal plantations, and the suckers so treated are said to produce larger and stronger plants than where they are taken direct from one field to another.

The system of maguey planting in the Philippine Islands differs materially from that of sisal planting in Hawaii and Yucatan. Maguey is usually set out but two or three feet apart each way, with the result that when the plants mature the fields become an almost impenetrable jungle. Various systems have been tried by planters in other countries. Some have planted as near as 6 feet apart each way, others as far apart as 9 by 11. With too close planting many leaves are torn and lacerated by the spines of adjoining plants, and the work of cultivation and harvesting is rendered extremely difficult. On the other hand, where the distance is too great, there is unnecessary waste of land. After long experience the Yucatan planters have generally adopted the row system, with plants 4½ feet apart in the row and rows 12 feet apart, giving approximately 2,000 plants to the hectare. The advantages of the row system are that it facilitates cultivation; admits air and sunlight which are necessary to harden and strengthen the fiber; expedites the work of cutting and handling the leaves; and gives room for replanting when the old plants are approaching maturity.

An improved system of planting is a reform that is urgently needed in the Philippine maguey industry. Close planting and water retting belong to the same period. With the introduction of fiber-extracting machines should come a system of planting that shall give us cultivated maguey fields where now we too often find only tangled wastes.

CULTIVATION.

A maguey field, after it is once well established, requires but comparatively little attention and cultivation. Where the suckers have been set out with reasonable care, the loss will be small. Two or three times a year the fields should be cleaned of weeds and grass, care being taken not to bruise the leaves of the growing plants, as any such injury will result in a discoloration of the fiber. Suckers will begin to grow from the roots of the old plants in from twelve to eighteen months, and such as are not required for setting new fields should be removed and thrown away. The growth of a large number of suckers on any one plant not only lessens the vitality of the plant but also tends to hasten the growth of the pole.

As maguey yields no return for three or four years it is sometimes desirable, while the plants are small, to cultivate another crop on the same land. The practicability of doing this will depend largely on the nature of the soil, maguey frequently being grown on land that will produce no other crop. At the Grenada Botanical Station, in the Windward Islands, one-half of a sisal field was planted with corn. It was noticed that the small sisal plants shaded by the corn made far greater progress than those without shade. (Bulletin Royal Kew Gardens, London, 1892.)

In the Bahama Islands similar results have been obtained with both corn and cotton. These crops are not only beneficial in furnishing shade, but they also keep down the weeds, and yield a product of more or less value. Camotes (sweet potatoes), which are frequently planted in abacá fields, should not be planted with maguey, as the vines would soon entirely cover the small plants and retard their growth.

The early or late poling of the plant is a consideration upon which may depend the entire success or failure of the industry. It is essential with a crop that yields no return for from three to five years after planting, that it shall continue productive for a considerable number of years without replanting. In the case of maguey the growth of the pole, which is soon followed by the death of the plant, is in part the result of natural conditions, and in part depends on the variety and care of the plant. The life of the Yucatan sisal plant, after the first cutting of leaves is from ten to twenty-five years; while that of the Bahama plant is from five to eight years. The longer life of the Yucatan plant is due to difference in variety, climatic and soil conditions, and the more careful system of cropping of the Yucatan planters. A humid climate and a moist soil tend to bring on early poling. The careless cutting of leaves, and either long delay in cutting or overcropping, have the same result. If the pole is lopped off as soon as it appears above the leaves, the life of the plant will be prolonged a year or more, allowing the leaves then on the plant to mature.

HARVESTING

The number of years required for the production of the first cutting of leaves is variable, depending on the size and condition of the suckers when planted, subsequent climatic conditions, and the nature of the soil. Ordinarily the first crop of leaves will mature in three or four years. In Hawaii the first leaves are cut at three years from the time of planting in the field, or four years from the time of setting bulbils in the nursery. The Yucatan henequin requires from four to seven years to mature the first leaves.

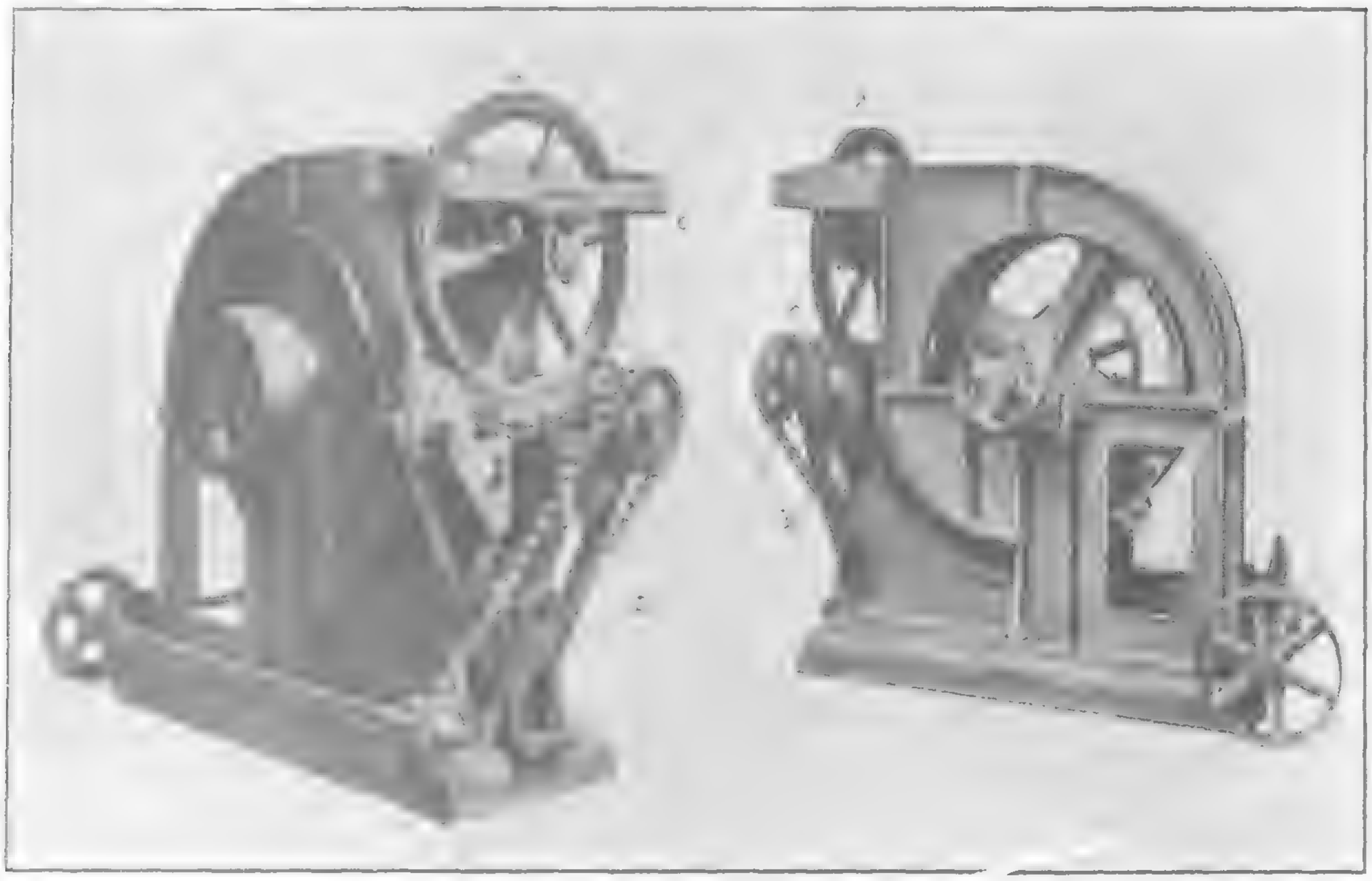
It is customary to harvest maguey once a year, preferably during the dry season. In the wet season the leaves contain a smaller percentage of fiber, and the frequent rains interfere with the work of drying. Each plant should yield from 15 to 30 leaves annually. There is no fixed rule governing the time for cutting the leaves, and this matter is one to be determined largely by judgment and experience. Only those leaves should be cut which incline toward a horizontal position and show signs of maturity. As too much cutting will soon destroy the strongest of plants, constant care should be exercised against overcropping.

The harvesting of sisal in Yucatan is done principally by Indians, who do this work with "corbas," the corba being a bolo having a blade curved at the end. An average day's work is from 1,500 to 2,000 leaves. Following each cutter is a woman, or boy, who cuts off the thorny sides and end spine of the leaves, and makes them up into bundles of fifty. These bundles of leaves are carried out to the roads, and transported on small tram cars to the cleaning machine.

EXTRACTION OF FIBER.

Maguey leaves should be cleaned within twenty-four hours after they are cut from the plant. If left for a longer period than this the fiber will become discolored at the ends.

An average leaf of maguey is from 4 to 6 feet long, weighs from one to two pounds, and is about one inch thick at the base. It consists of a mass of cellular tissue, through which run the fibro-vascular bundles, or fibers.



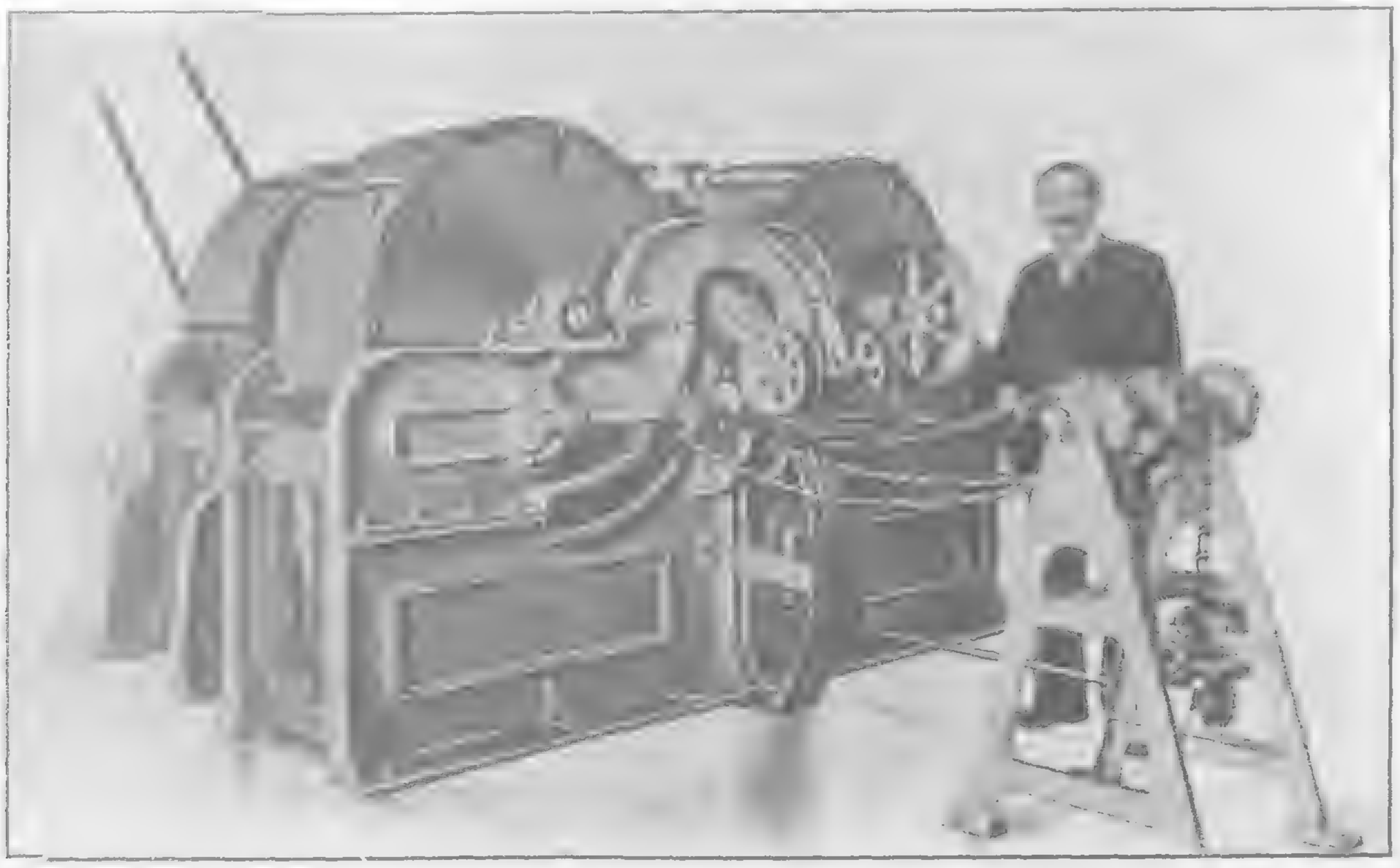
"PIONEER" FIBER-EXTRACTING MACHINE

The work of fiber extraction consists in separating the pulpy portion of the leaf from these fine filaments. There are two general methods by which this end is accomplished. The leaf may be placed in water until the pulp becomes so rotten that it can be easily removed by washing and beating; or, the leaf while still green may be treated to some scraping process that removes the pulp and leaves the cleaned fiber.

The first of these methods, known as "retting," is the way in which maguey fiber is ordinarily cleaned in the Philippine Islands. In the retting process the leaves are first cut from the plant and the thorns and spines are removed. These leaves are then beaten and crushed, or are split into several pieces, and are frequently made up into small bundles. These bundles are placed one upon another in the tidewater of some nearby river or creek, where they are allowed to remain from seven to fourteen days, or until the pulp can be easily removed from the fiber. As the leaves at the bottom will ferment more rapidly than those nearer the top, the bundles are turned every few days, but even where the greatest care is taken some of the leaves will be overretted and the fiber weakened. The retting process requires a great deal of time and labor, and results in the production of an inferior quality of fiber. It can only be recommended where the purchase of a fiber-extracting machine is an impossibility.

The leaf of sisal hemp is practically the same as that of maguey, and can be cleaned by the same methods. Retting, however, has never been generally practiced in the sisal-producing countries. Previous to the invention of a machine for extracting sisal, this fiber was cleaned in Yucatan by a scraping process. Crude, wooden implements, known as the "pacché" and the "tonkas," were used for this work. With these implements one man could clean only from 6 to 9 pounds of fiber daily.

The first machine used for cleaning sisal, which was the "raspador," was the invention



"PRIETO" FIBER-EXTRACTING MACHINE

of a Franciscan friar. This machine is still used to some extent, and all of the improved, automatic fiber-extracting machines that are used to-day for cleaning sisal and maguey are constructed on the same principle and are but improvements of this old machine.

The raspador consists of a 54-inch wheel which runs in a heavy wooden case. Across the 6-inch face of this wheel, about one foot apart, are placed brass scraping knives. The leaf is inserted through a hole in the case, being held by a clamp, and whips downward as the wheel moves around. A heavy curved block placed underneath is then, by means of a lever, brought to bear on the leaf pressing it against the revolving wheel, which almost instantly crushes and scrapes away the pulp. The leaf is then withdrawn and the other end cleaned in the same manner. Two operators are required for the raspador, one of whom feeds the leaves into the machine while the other operates the lever.

On the sisal plantations the raspador has now been largely superseded by the "Prieto," the "Torroella," and other automatic machines, which clean from 50,000 to 150,000 leaves per day. Where these machines are used, one-half of each day's cutting of leaves is reserved for the following day so that the work of cleaning can commence in the early morning. The leaves are not, however, allowed to accumulate, as after twenty-four hours they begin to harden and are difficult to clean.

In cleaning with the improved automatic machines, the bundles of leaves are first placed on endless carriers, which take them up to the machine platform and drop them on the feed tables. The bundles are then broken and the leaves fed into the grip chains which draw them into the machine. These machines have either two or three scraping wheels, somewhat similar to those of the raspador. On the grip chains the leaf is conveyed to the first scraping wheel which instantly cleans one-half of it. It is then carried on to the second scraping wheel, and in the case of the three-wheel machines subsequently to the third wheel, which cleans the other half in a similar manner, the cleaned fiber being thrown out at the opposite end of the machine. One machinist is required to attend to the machine, one man to feed it, and two boys receive and handle the fiber.

FIBER-EXTRACTING MACHINERY.

The introduction and the use of fiber-extracting machines is the most vital question affecting the maguey industry. Without such machines the cultivation of maguey is confined to limited areas near the seacoast, where the tide water can be utilized for retting the leaves. The fiber thus produced is inferior in quality, and can never rank with sisal in the markets of the world. The introduction of machinery is, in fact, absolutely essential, if any considerable development of the maguey industry is to take place.

The principal obstacle to the immediate use of the large automatic machines in the Philippine Islands is, that few of our maguey planters are in a position either to purchase these machines or to use them to advantage. Maguey has been planted in small and widely scattered fields, and the facilities for transporting a large number of leaves to any one central point are extremely poor. An improved fiber-extracting machine, to be profitably operated, must have such s supply of leaves. There are a few plantations, or localities, that will soon be in a position to use one of these machines, and the number will undoubtedly increase as the industry develops. What is most urgently needed at the present time, however, is a small machine of limited cost, weight, and cleaning capacity, that can be used on the smaller farms.

The old Mexican raspador has been brought into the Islands, and has been given numerous trials and experiments. The results obtained have not been entirely satisfactory. The quality of the fiber cleaned by the raspador is excellent, but the amount of fiber obtained is hardly sufficient to justify the cost of operating the machine. The use of the raspador in its present condition can not be recommended. A small machine, the "Pioneer," constructed on the same principle as the raspador but with certain improvements, is soon to be introduced into the Philippine Islands. If this machine does the work that it is claimed to do, it should be admirably suited to the present needs of the Philippine maguey planter.

There are a number of different automatic fiber-extracting machines in quite general use in Yucatan. While each of these machines has its partisans, the "Prieto" appears to be in most general use. Ordinarily these machines do not clean up to their full capacity because of the ignorance of the labor used to operate them. The machines used in Yucatan, and the cost of each, are shown in the following table, prepared by the American consul in Merida:

Hemp-cleaning machines in actual use upon the plantations in Yucatan.

Machine.	Number of leaves cleaned in ten hours.	Number of men needed	Actual horsepower.	Cost of machine. Mexican currency*	Cost of machine. United States currency.
Lanaux reformed	150,000	4	25	$7,000	$3,000
Prieto reformed	150,000	4	16	8,600	3,689
Torroella reformed	100,000	4	16	7,000	3,003
Villamor reformed	100,000	7	16	5,000	2,145
Stephens	150,000	3	70	(†)	(†)
Solis	9,000	3	9	2,000	858

*The average value of the Mexican peso in 1902, according to the United States mint, was 42.9 cents.
†No more being made.

DRYING AND BALING THE FIBER.

The machine-cleaned maguey fiber of Laoag is washed after it is taken from the machine, and is then dried in the sun. The sisal produced by the Hawaiian Fiber company is washed as it passes through the machine. In Yucatan the fiber is not washed but is taken from the machine, placed upon small trucks, and carried at once to the drying yards. In the yards the fiber is hung over galvanized-wire racks to dry in the sun. If allowed to remain any length of time after cleaning, without exposure to the sun, it will become dark and spotted. If exposed to rain or dew it loses its luster. On one or two of the Yucatan plantations galvanized-iron piping is now used in place of wire with satisfactory results. In Hawaii the wet fiber is taken from the machine and is laid on the ground to dry. While this method of drying gives a fiber that is straighter and, therefore, more easily handled in the baling press, its desirability is to be questioned.

When quite dry the fiber is taken to the baling press in which it should be laid straight without doubling over. On the smaller Yucatan plantations screw presses are used, and on the larger estates hydraulic presses. The weight of the Yucatan bales is variable, ranging from 14 to 16 arrobas, 350 to 400 pounds. The dimensions of a 15-arroba bale are 32 by 25 by 44 inches. Hawaiian sisal is put up in bales weighing 500 pounds, with dimensions of 54 by 30 by 30 inches. The bales are not covered and are tied either with cheap rope or with twisted fiber. Practically all of the Philippine maguey fiber is shipped to Manila and baled on the abacá presses.

YIELD.

The annual yield per acre of maguey fiber will depend upon the number of plants per acre, the number of leaves cut from each plant, the size and weight of these leaves, and the percentage of fiber which they contain. These several factors are so variable, even on a well-organized plantation, that we find the widest variations in the estimates of fiber yield. On two adjoining plantations, where conditions are apparently the same, quite different results may be obtained. The estimates made by authorities and by planters as to the average yield of sisal per acre range from 400 to 1,500 pounds.

The yield of maguey is considerably less than that of sisal. This is due in part tothe difference between the Yucatan and the Philippine plant and fiber; and, also, to the more highly developed system of cultivation of the Yucatan planters. Maguey fiber is finer than sisal, and from a given weight of leaves we get a smaller percentage in weight of fiber than is obtained in Yucatan. With respect to cultivation, the close planting and over-cropping so commonly practiced by our maguey planters result in the production of many small and undeveloped leaves.

In Yucatan it is generally estimated that 82 plants will give an annual yield of 100 pounds of fiber. On this basis, with plants set at 4½ by 12 feet apart, or approximately 800 to the acre, the fiber yield per acre would be 975 pounds. Under average conditions each plant should yield annually from 15 to 30 leaves, giving a total of from 12,000 to 24,000 leaves per acre. The fiber yield is, ordinarily, about 50 pounds per thousand leaves. The fiber yield from 12,000 leaves, at 50 pounds per thousand, is 600 pounds; and from 24,000 leaves, at 50 pounds per thousand, 1,200 pounds, or an average of 900 pounds of fiber per acre.

The following table, showing the results of experiments made by Dr. Charles Richards Dodge in Yucatan, indicates the average weight of leaves and the percent of fiber which they contain:

Lot.	Age.	Weight, 10 leaves.	Fiber yield.
	Years.	*Pounds.*	*Per cent*
1	5	20	3.27
2	10	10	5.57
3	10	15½	5.92
4	15	8¾	7.67
5	15	14	5.64
6	30	8	6.87
7	32	15	5.[illegible]
8	7	21¼	4.45

The average fiber yield of maguey in the Philippine Islands can not be accurately estimated for the reason that we have no uniform system either of planting or of harvesting. Estimates made by Philippine planters as to the average yield of maguey fiber range from 20 to 40 pounds per thousand leaves. The fiber yield from 12,000 leaves at 20 pounds per thousand is 240 pounds; and from 16,000 leaves at 40 pounds per thousand is 640 pounds, or an average of 440 pounds per acre. In experiments made at the Singalong Experiment Station in Manila, the average weight of a single mature leaf of Philippine maguey was found to be 28.1 ounces, and the yield of fiber 2.6 per cent. On this basis 1,000 leaves would yield 45.6 pounds of fiber, or one acre producing 16,000 leaves would give an annual fiber yield of 730 pounds.

VALUE.

On February 23, 1906, the market quotations in Manila for maguey fiber were as follows: No. 1, ₱15; No. 2, ₱12; No 3, ₱9 per picul. On December 29, 1905, a sample of maguey fiber, submitted to the firm of Macleod & Co., in Manila, was reported upon as follows:

The sample of machine-cleaned maguey fiber you left here is very handsome, and I should say of a value equal to sisal, say, 7½ to 7¾ cents, United States currency, f. o. b. New York; or, say, ₱15 in Manila. It might be a little cleaner of wood, or pulp, and the ropy ends are objectionable, but we constantly have the same defects in the Yucatan sisal. This sample is infinitely better than the old salt-water-retted, hand-cleaned Manila maguey. It is not quite as strong as sisal, but finer in texture.

Samples of maguey forwarded to London in October, 1905, were quoted at £30 per ton, the London quotation for sisal on the same date being £37. Machine-cleaned maguey fiber forwarded to fiber brokers in New York City, in 1905, was reported to have approximately the same value as sisal. The usual New York quotation for No. 1, hand-cleaned maguey are from one half to three-fourths of a cent less per pound than for Yucatan sisal.

(Continued on page 144)

CUTCH

UTILISATION OF MANGROVE BARK

Collection and Export of Mangrove Bark

In German and Portuguese East Africa, where mangrove bark has, perhaps, been more systematically worked than elsewhere, the mangroves were at first cut down for timber, and the bark was wasted until its value as a tanning agent was discovered. In the German Protectorate the bark is now stripped from the stems and branches of the living trees, conveyed to convenient centres, broken up, and dried in the sun (or by artificial heat produced usually by the combustion of mangrove timber), and exported.

The industry is under the control of the Forest Department, which insists on the bark being carefully stripped, so that the trees are not destroyed (stripped trees are said to renew their bark in from four to six months), and the authorities also prohibit the export of bark containing less than 45 per cent. of tannin.

In M. Baillaud's experiments much the same plan was followed, and it was found that natives working piece-work could collect about 200 lb. of bark per day, and it was estimated that to place a ton of the bark in Europe would cost fr. 124 c. 50, which seems to be an unnecessarily high figure. It was noticed that if the bark is exposed to the rain after collection, a considerable loss of tannin occurs, so that it is desirable that the drying be conducted under cover when wet weather prevails. In the East Indies the bark is stripped, then dried, and roughly ground and packed in small bales, sometimes under pressure. In this way the cost of transport to Europe is reduced somewhat. Allusion has also been made to the fact that the authorities in German East Africa prohibit the export of bark containing less than 45 per cent. of tannin, and where such regulations are not officially in force, it would be well for exporters to adhere to this rule, since tanning materials are now almost universally bought on their actual content of tannin, and mangrove bark containing less than 45 per cent. of tannin is scarcely saleable, and the inclusion of such material with good bark might lead to losses.

But little attention has as yet been paid to the utilisation of mangrove timber. M. Baillaud states that it is, as would be expected, peculiarly resistant to the action of water, and is therefore suitable for the construction of piles, railway sleepers, and similar articles where hardness and great resistance to the action of water are of importance. It has also been used for street paving in Paris, but apparently the price obtainable for it for this purpose did not prove remunerative.

In the countries where mangrove bark is principally produced at the present time, skilled labor is not usually available, and consequently the manufacture of Mangrove Extract from the bark is difficult if not impossible. Therecan beno doubt, however, that if the extract could be made in these countries much of the poorer bark at present discarded could be utilized, and as the export of extract would mean that only the really useful portion of the bark would be sent to Europe, a great saving in the cost of transport would be effected. It may be worth while, therefore, to give here a short account of the modern process of preparing tanning extracts from mangrove bark and similar products.



PHILIPPINE MANGROVE SWAMP IN THE LAMAO FOREST PRESERVE

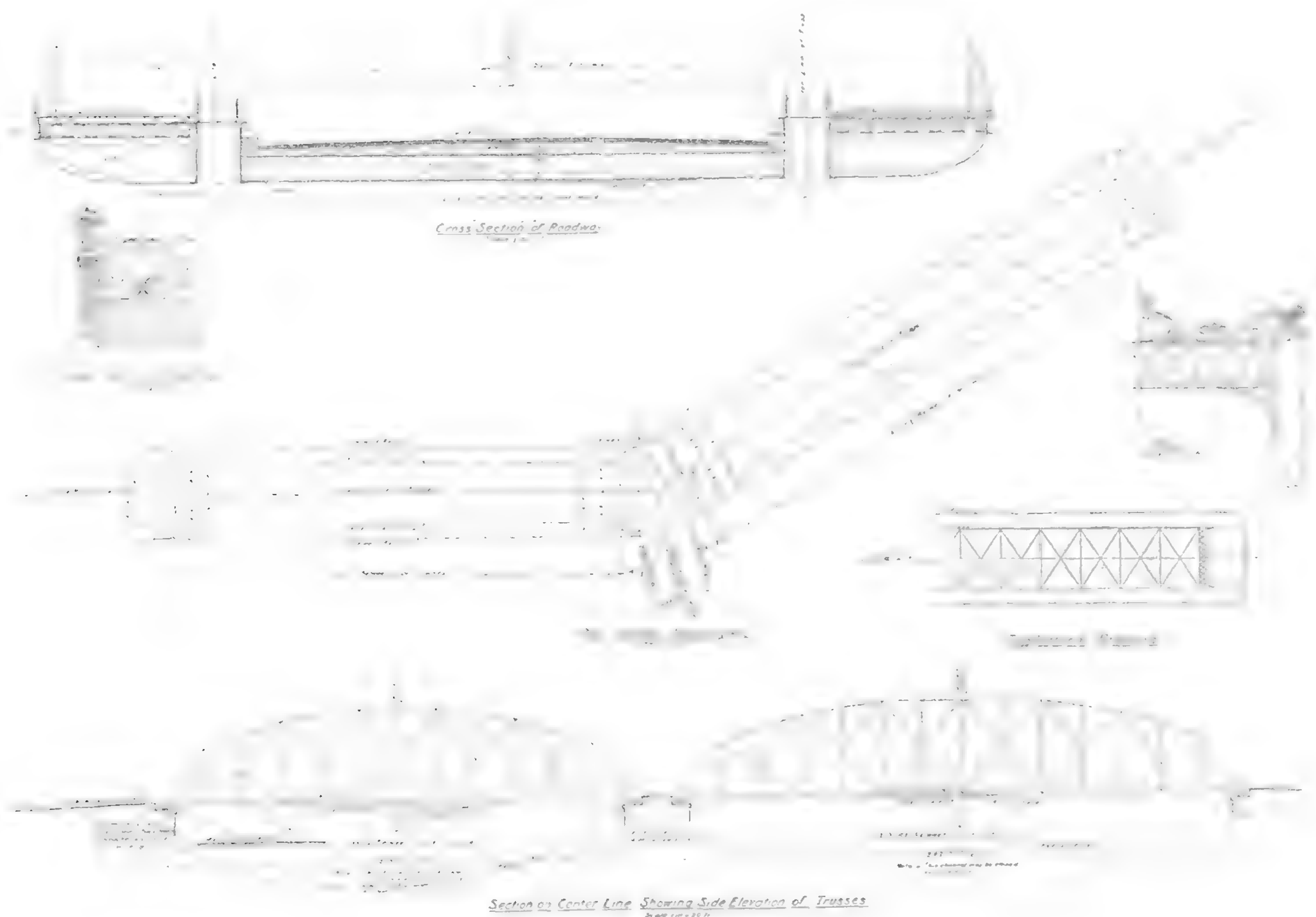
The bark, after being thoroughly air-dried, is ground in a bark mill or disintegrator so as to form a powder, through which water will percolate slowly. This is then packed into "leaches" or extractors, which usually consist of round pine-wood tubs, strengthened by iron hoops and provided with perforated false bottoms, below which the extracting liquor may collect. A series of these "leaches" is employed, a connection by means of a copper or leaden pipe running from the chamber below the false bottom of each to the mouth of the next. Each is also provided with a pipe, whereby steam can be introduced, so that the extracting liquid may be heated to any desired temperature. Water is allowed to flow into the first extractor of the series, which is then heated by means of its steam jet. The warm water percolating downwards through the ground bark, extracts the tannin and other soluble matters, and the liquor so produced gradually accumulates below the false bottom, and as this fills the liquor is forced by the pressure of the water, which is continually supplied to the first extractor, over into the second extractor, and so on throughout the series, until from the last a comparatively strong liquid is obtained. This is then run into a vacuum-evaporator of the Yaryan or similar type, in which it is exposed in thin layers for a short time to a temperature of about 80° C., whereby it is converted into a thick liquid of specific gravity 1.2. Thence it is run into an ordinary vacuum-pan, and evaporated *in vacuo* to a satisfactory consistence. The process thus briefly outlined yields a satisfactory extract (cutch) for dyeing purposes, but one of the greatest objections to the use of mangrove bark or extract for tanning purposes is that it produces a leather having an objectionable red color, and consequently it is necessary in manufacturing extracts for tanning purposes to decolorise the liquor at one stage in the process. This is necessary not only because of the coloring matter naturally present, but also because in the process of manufacture the application of heat to the tannin and extractive matters leads to the production of dark-colored substances by their partial decomposition. The decolorising process is usually carried out with the liquor as it comes from the extractors, and consists in the addition of small quantities of albumen, alum (or aluminum sulphate) or similar material, which forms an insoluble compound with a small portion of the tannin, and as this settles out it carries with it a great part of the objectionable coloring matters. Bleaching agents such as sulphur dioxide or salts yielding this have also been used for the decolorisation of mangrove and other extracts to be employed for tanning purposes, but none of these methods have so far succeeded in completely and permanently eliminating the red color. This is the most serious difficulty in the way of an extension of the use of mangrove bark as a tanning agent, and recently the German Colonial Society has offered a prize of 3,000 marks for a satisfactory and permanent method of decolorisation. The conditions under which this prize is offered are given in *Der Tropenpflanzer*, 1905, pp. 475-6.

The total cost of a small plant arranged on modern lines for the manufacture of mangrove extract, and with a sufficiently large-capacity to be remunerative in working, would probably be from £450 to £500.

(Continued on page 138.)



NEW AYALA BRIDGE OVER THE PASIG RIVER, MANILA



PLANS OF AYALA BRIDGE, MANILA



NEW AYALA BRIDGE, MANILA

GOVERNMENT PURCHASE OF JAPANESE RAILWAYS

(Continued from page 118)

THE GAN-ETSU RAILWAY

Capital	2,640,000
Cost of construction	2,584,596
Estimated price of purchase	2,584,596

The total of the estimated prices of purchase reach *248,013,821 yen.*

In the cases of the Nishinari and Gan-etsu Railways, the prices of purchase are expected to be below the costs of construction. In the above table the costs of construction are provisionally taken as the prices.

The prices of the Gan-etsu and Nishinari Railway will be fixed by carrying out negotiations with those companies. The exact prices of the other railways will be fixed according to the provisions of the Railway Nationalization Law, on the basis of the costs of construction on the date of purchase. But these prices will not be so much different from the estimated prices.

The public loan bonds to compensate the railway companies are to be handed over within a limit of five years. The date of the issuance will be fixed according to the circumstances of the financial world. The Government is going to dispatch engineers to inspect the railways to be purchased.—*Japan Times.*

YOKOHAMA HARBOUR IMPROVEMENTS

THE SCHEME.

The first meeting of the Yokohama Harbour Improvement Committee was held on the 26th ult. at the official residence of the Minister of Finance. The general outline of the improvement scheme was discussed and a plan and estimates drawn up by the Department of Finance and laid before the committee were approved with some slight modifications. The outline of the improvement scheme as approved by the committee is as follows:

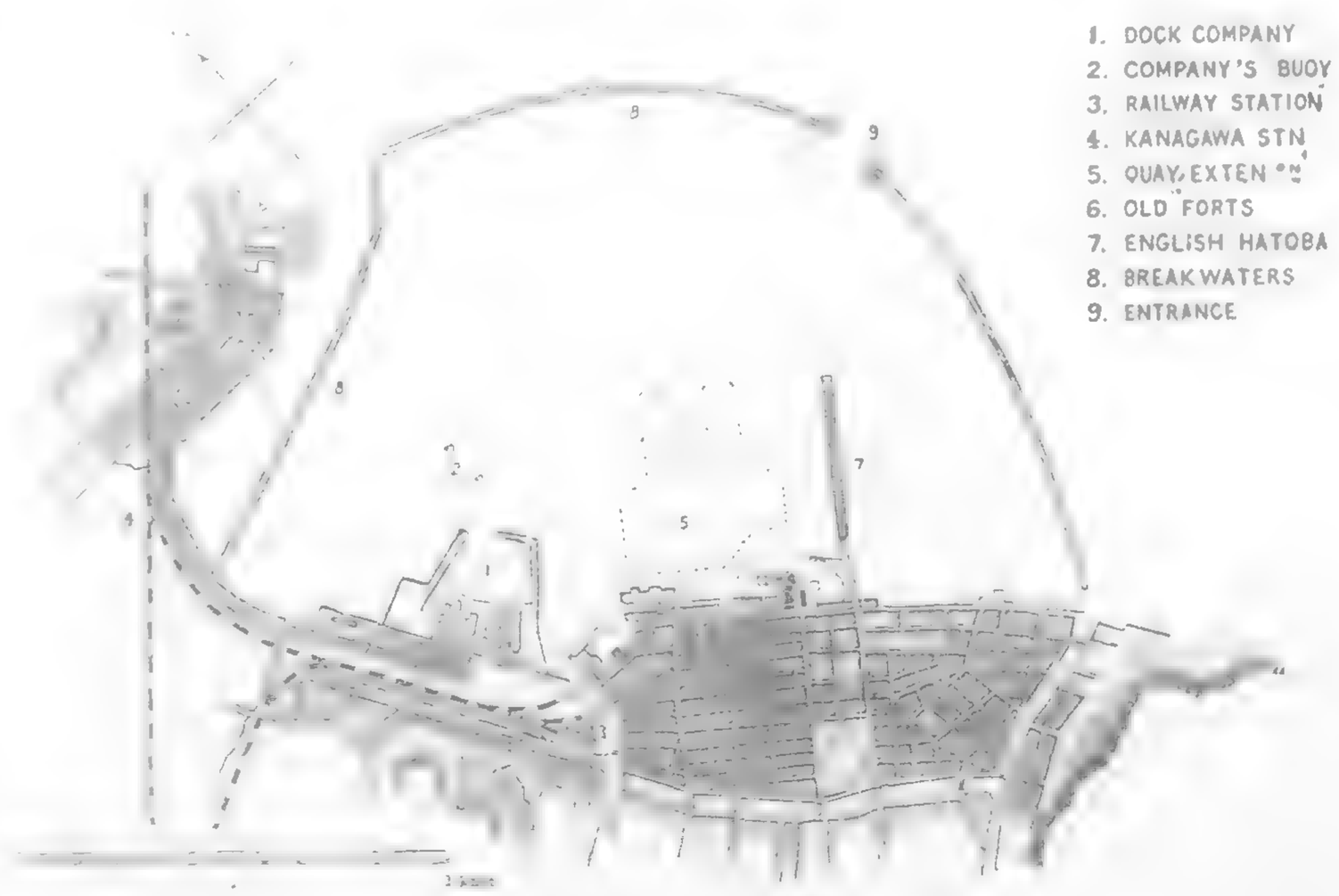
Reclamation Work.—According to the original plan the foreshore in front of the Customs, recovering 68,600 tsubo, is to be reclaimed. Inasmuch as a portion of the work, covering 47,803 tsubo, was accomplished in December last, there remains only 20,797 tsubo to be reclaimed. The height of the reclaimed land is to be 12 ft. in. above the sea-level at ebb tide, and the length is to be 620 ken, the depth of water alongside being above 16 ft. and under 28 ft. The effective space available will measure 506 ken (or 3,036 ft.). The length of the already reclaimed land is 517 ken (or 3,102 ft.), the effective length being 415 ken (or 2,670 ft.) Altogether the total length of the wharves will be 1,137 ken (or 6,822 ft.) and the length available 951 ken (or 5,606 ft.). It will thus provide berths for 13 vessels with an aggregate tonnage of above 54,500 tons, besides providing ample wharves for discharging and loading cargo for junk traffic and embarkation piers for steamship passengers.

Accommodation on Land.—(1) Sheds.—The sheds to be constructed on the reclaimed land are classified into two kinds—iron and wooden sheds. The former are to be built along the wharves, keeping a space of about six ken (30 ft.) from the edge. These are to be used for storing general cargo, and will consist of thirteen divisions, altogether covering 10,710 tsubo. The wooden sheds are intended for the cargo of the junk traffic exclusively, and are therefore less elaborate in structure. All the sheds will be fitted with electric lights, thus facilitating the inspection and storing or discharge of cargo in the night time. (2) Warehouses.—In addition to the sheds, four warehouses, altogether covering 3,097 tsubo, are to be constructed on the reclaimed land. A three-storied building is also to be built, and this building is to be fitted with elevators worked by electric motive-power of two tons capacity. (3) Railways.—Two or three lines of railway are to be constructed between the wharves and the sheds, and the sheds and the warehouses. One of these lines is to be used for discharging and loading the cargo, and another for railway traffic. All the lines are to be so laid as to concentrate at the centre of the reclaimed land, there connecting with the trunk line leading to and from Yokohama railway station. A branch line again is to run across a new railway bridge to the Customs compound to connect with another branch line to be laid in the compound. The whole length of the railway line is to extend for eleven miles. (4) Roads.—In order to facilitate the transportation of goods and travellers, six roads of different dimensions are to be laid on the reclaimed land. The width of the roads is to vary from 12 to 8 ken. In the wider roads footpaths are to be provided for pedestrians. (5) Cranes.—At the end of the eastern wharf a fixed crane of 30 tons capacity is to be provided and also a crane of 20 tons capacity at the end of the western wharf. In front of the sheds altogether 33 movable cranes, varying from 1½ to 5 tons capacity, are to be provided to facilitate the handling of cargo. All the cranes are to be worked by electricity.

Besides the above, water pipes and drains are to be laid down on the reclaimed land and the Customs compound railway and other bridges are to be constructed. The provision of the accommodation on land is to be commenced on the already reclaimed land. The total cost of the work is estimated at 8,180,000 yen, and the scheme is to be accomplished in a period of six years, as already reported.—*Japan Herald.*

OPENING OF THE AYALA BRIDGE, MANILA.

True to their promise the Atlantic, Gulf & Pacific Co., contractors for the erection of the Ayala Bridge over the Pasig River, had their work completed on Occupation Day, August 13th ulto., and have added one more completed public improvement to the city. The specifications and other data on this bridge appeared in the FAR EASTERN REVIEW of August, 1904.



YOKOHAMA HARBOR

THE KAIPING ENTERPRISES

The manager of the Chinese Engineering and Mining Co., Ltd., at Tientsin, recently invited the representatives of the Shanghai journals to visit the mines and works of that Company. The following description of the trip, appearing in the *North China Daily News*, is of such interest that we reproduce it in full.—Ed. F. E. R.

The Chinese Engineering and Mining Co., Ld., which has only been in existence for some five years, is attracting more and more attention in business and shipping circles as the great coal-producing agency of North-China. The Company possesses extensive and almost inexhaustible coal-fields in the Kaiping district of the Province of Chihli, near the Gulf of Pechili. The collieries are centred between the port of Tangku and the Company's own port of Chinwangtao. They are sixty-two miles east by rail from Tangku and seventy-three miles west by rail from Chinwangtao. The Imperial Railways of North-China bring them into close connection with Tientsin, and the Company has a canal of its own, about fifteen miles long. The situation of the collieries is, therefore, all that can be desired from the point of view of speedy and economical transport.

It must not be supposed, however, that the Company confines themselves to the mining of coal only. In addition they are manufacturers of coke, coal tar, bricks, cement, roofing and flooring tiles, water and drain pipes and lime. At the extensive workshops at Tongshan all kinds of iron work, machinery, and repairs for marine and land work are also undertaken, whilst at the collieries their thoroughly-equipped laboratory enables them to give reliable assays, to undertake analytical work, and to report on mining properties in the province of Chihli. Last but not least in importance for the successful working of this great undertaking, the Company possess an efficient fleet of steamers which are engaged chiefly in coal transport and partly in the general shipping and passenger trade in North-China.

That which, however, is of special interest to the general public is that the shortest sea route between Shanghai and Tientsin is viâ Chinwangtao. The unfortunate travellers (and they are many) who have been "stuck on the Bar" for a week or even longer will be able to appreciate the advantage of being able to travel from Shanghai to Peking (875 miles) in something less than seventy-two hours. The whole journey has, indeed, been accomplished in fifty-seven hours. The incoming steamers are timed to connect with the morning mail train which leaves Chinwangtao at eight o'clock. The steamer is generally in good time to catch this train, and it is on record that it has only on one occasion been too late to do so. The journey from Shanghai to Tientsin is independent of the uncertainty and delay due to the Bar attaching to the Tangku route. Visions of long delays, of "days of fuming and fretting," of cherished designs brought to nought and business matters hindered and delayed, all rise up; to be succeeded by a feeling of satisfaction that these are all things of the past which need never vex or trouble us again. Henceforth in comfort, and with the assurance that in all probability we shall reach our destination at the specified time, we may start on our journey to the great northern capital.

Chinwangtao is the natural distributing centre for the north-west part of the province of Chihli, and in the winter season, when the ports of Tangku and Tientsin are ice-bound, the whole import and export trade of the entire province passes through it. In the summer only the steamers of the Chinese Engineering and Mining Co. make use of Chinwangtao. Nevertheless, it has become a formidable rival for the enormous trade which formerly used to be wholly shipped through Tangku and Tientsin, by virtue of the advantages which it possesses over these ports in point of saving of time and handling of cargo. We have already mentioned how speedily and certainly Tientsin may be reached viâ Chinwangtao. By the other route when steamers, even of moderate draft, arrive at Taku Bar, the owners are compelled to lighter them, on account of general scarcity of water on the Bar, and then proceed up river to Tangku and Tientsin. This makes the length of the voyage viâ Taku to Tientsin to be most uncertain, a week or more not infrequently being required to accomplish it.

The land in the vicinity of the port of Chinwangtao belongs to the Company and a breakwater and pier have been erected. The berthing accommodation is sufficient for half-a-dozen good-sized vessels, with a number of smaller ones in addition. The pier has also berths for two ordinary coasting steamers. A branch line of railway, connecting with the main line of the Imperial Railways of North China running from Peking to Newchwang, has also been laid down. Tangko station being three or four miles distant from the harbour works. This branch line leads down to the steamers' berths at the breakwater and pier and connects by a loop line with the Company's godowns and coal yards. By these arrangements passengers are enabled to step from the ship into the railway car.

The above-mentioned advantages and facilities afforded by the route to Tientsin viâ Chinwangtao, not being as well known as they ought to be, induced the Chinese Engineering and Mining Co. to make arrangements for a special trip for representatives of the Shanghai Press. The Company's fleet is not a large one but just about a year ago they added a very fine steamer, the Kaiping, one of the largest on the coast of China. This magnificent vessel is commanded by Capt. Macfarlane, late of the Hsiping, who brought her out from home, and who, in conjunction with Mr. Joseph Blackett, the well-known naval architect in London and superintendent engineer for the owners, supervised the construction of the vessel. It was on this ship that the representatives of the Press travelled on their tour of inspection, and a few particulars in reference to her dimensions and accommodation may prove of interest to those who will probably travel on her in the near future. That many will do so, especially during the winter season, there can be no doubt, her accommodation for both foreign and native passengers being so excellent that she is certain to be well patronized. Her length over all is 312 feet, gross tonnage, 2,546, net tonnage 1,605, and she carries a load of 3,543 tons on a draught of 19 feet 4 inches, steaming at the rate of 13 knots per hour. Her indicated horse-power is 2,700. If not particularly beautiful in appearance, she yet impresses one with the idea of solidity and comfort. Her engines consist of a set of triple-expansion engines, steam being supplied by two large single-ended boilers, working at 180 lbs. pressure. Six powerful steam winches are fitted, there is steam steering-gear amidships, hand screw gear aft, patent direct steam windlass, large donkey boiler, strong derrick gear, and an electric light installation, including lamps in the hold and on deck to enable goods to be loaded and discharged during the night. The boilers are fitted with Howden's system of forced draught, and See's patent ash ejectors are used. These ejectors are similar to those being fitted to the new express Cunarder, the Mauritania, now in course of construction by the builders of the Kaiping.

In the central deck-house forward is the captain's saloon, and just aft of this is the ladies' lounge and the entrance staircase of the saloon, one noticeable feature of which is its height—eight feet from floor to ceiling. All the decks, indeed, are of unusual height and the alleyways are lofty and airy. There are nine state-rooms in all, accommodating twenty passengers, each one being fitted with electric fan and light. The excellently fitted lavatories and bathrooms adjoining leave nothing to be desired. There is also accommodation for thirty first-class and the same number of second-class Chinese passengers. On the bridge deck is a commodious wheel-house; on this deck there is also a Kelvin's compass with the latest modern improvements, probably the only one of its kind on the coast. There are four large life-boats and aft are gig and pinnace.

It was, as we have said, to this well-equipped and comfortable steamer that the small launch of the same name as the vessel brought the little company of representatives of the Press on the evening of the 6th instant. She lay at the Company's wharf distant about three miles from Shanghai, and on arrival Mr. Frischling, the Company's Marine Superintendent, was soon at hand to impart any information required. At 5 a. m. the next day the vessel started and experiencing delightful weather the whole way we arrived at Chinwangtao at 5.30 a.m. on the 9th, thus having made the journey of 635 miles in 48½ hours. The same journey was accomplished last December in 48 hours 15 minutes, which is at the rate of about 13.2 knots per hour. The extra quarter-of an-hour required for the present voyage was due to the hindrance occasioned by the new regulations of the Huangpu Conservancy Board; at least this is the explanation given by the captain. Chinwangtao has very appropriately been called "the open door to Peking," the distance by sea from Shanghai to the capital being about forty miles less than the route viâ Tangku, to say nothing of the certainty of being able to arrive at the specified time by the shorter way. Holiday-makers who are seeking rest and recuperation at Peitaiho, the delightful summer resort of North China, will find it economical and very much more expeditious to go there viâ Chinwangtao rather than by the former route viâ Tientsin. The Peitaiho station is only about sixteen miles from Chinwangtao. Chinwangtao itself (to which the first vessel, the Peiping, went in the winter of 1896, before there was any pier or breakwater), as a seaside resort or sanatorium has few places to equal it and it is certain to become a favorite summer resort now that such quick and easy access to it can be had. A beautiful sandy beach, dry and bracing climate and a magnificent view, are some of the principal attractions which are to be found there. Arrangements, too, have recently been made between the Chinese Engineering and Mining Company and the Hamburg-America line for a joint tariff with interchangeable tickets for use on the steamers of the two companies between Shanghai and Tientsin. It will be possible, therefore, for passengers to make the fast journey viâ Chinwangtao, and return for variation by way of Chefoo and Tsingtao or vice versa. Another change which will no doubt be appreciated is the quotation of the fares in dollars instead of in taels as heretofore.

The day before our arrival at Chinwangtao a French fleet of three gunboats and four torpedo boats had arrived and French soldiers were in evidence everywhere. The barracks accommodating the soldiers of four or five different nationalities were visible from the ship and the "Admiralty Pier," built as a temporary structure by the British in 1900 to land troops and stores, but afterwards made into a permanent one at the expense of the various nations concerned, is a conspicuous object in the distance, whilst here and there substantial-looking buildings, the residences of those connected with the Company, are seen. The French admiral was traveling to Tientsin on the same train and a body of Chinese soldiers was drawn up to salute him at Tangho. A diminutive Japanese soldier, taking keen notice of everything that was happening, was very much in evidence,

and we were informed that one such was present on the arrival and departure of every train, but for what purpose did not appear to be very clear to anyone.

After a very pleasant run of 162 miles in the luxuriously-fitted train, we arrived at Tientsin soon after 3 p. m. The first half of the journey as far as Tongshan, where the Company's coal mines are situated, is through pleasant hilly country, one feature of which is the number of walnut trees, but after Tongshan is passed the country is very flat and uninteresting—quite desert in fact. The soil is so salt and so frequently under water that no cultivation of it is possible. It is, therefore, with a feeling of relief that the city of Tientsin is seen in the distance. Arriving there a short carriage drive through the French and English Concessions brought us to the Astor House. In the evening we were entertained to dinner by Major Nathan, brother of Sir Matthew Nathan, Governor of Hongkong, and General Manager and Agent of the Company. It was under Major Nathan's hospitable roof that we had an opportunity of meeting our confrères in the journalistic world who live in Tientsin.

It had been arranged to delay the departure of the Kaiping for one day, in order to permit any of the party who felt disposed to do so to go to Peking. The journey of some eighty miles was made in a little over three hours. The country was much more picturesque and interesting than that between Tientsin and Tongshan. The Grand Hotel des Wagons-Lits at Peking, just inside the Chien Men and close to the railway station, leaves nothing to be desired in the way of accommodation, and one would willingly have spent a much longer time in visiting the famous places in the great northern capital. But at eight o'clock in the morning, punctually (and in China, too) we were speeding on our way to Tongshan, distant about 160 miles. The short stay at Tientsin *en route* enabled us to make the acquaintance of Mr. Foley, the genial General Manager of the railway, who, with Major Nathan and other friends, was on the platform awaiting the arrival of the train.

Tongshan, where are to be found the collieries of the Chinese Engineering and Mining Co., is situated at about an equal distance between Chinwangtao and Tientsin. A descent into these coal mines, among the largest in the world, if not exactly a pleasant experience, is certainly one of a most interesting nature. And the unsparing efforts put forth by Mr. N. Paquet, the Engineer-in-Chief, Mr. Knauer, the Engineer-in-Charge, and Mr. Ley, Mr. Paquet's Secretary, left nothing to be desired. The mines have been worked by the Chinese for centuries, but only superficially, as they lacked the proper machinery and requisites for developing them. The late Viceroy Li Hung-chang, in 1878, took great interest in these mines, but it was not until 1901, just after the Boxer troubles, when the colliery passed into the possession of the Chinese Engineering Mining Co., that any steps adequate to the requirements of such an important enterprise were taken. Now they have developed to such an extent that the output of coal per day is fully 3,000 tons and more than 3,500 men are employed in the mines at Tongshan, working in three shifts of eight hours each. In addition to the principal mine at Tongshan, there is another at Linsi, distant about thirteen miles, the nearest railway station being Kuyeh. About 2,000 men are employed here. This mine promises in the not very distant future to become the most important of all, the mining operations being easier than at Tongshan. At the Northwest shaft about one mile from Tongshan, 600 men are employed. The coal produced by the Company is extensively used over the whole of the coast of China, and is quickly supplanting the native product used in the interior on account of cheapness. It is also used on all the railways of North China. It seems, moreover, that the demand for it is greater than the supply.

The collieries present a scene of great activity and bustle and everywhere evidence is seen of a vast and growing concern. There are about 750 men at work in the various workshops above ground. These workshops have been reorganized and extended. Modern and efficient plant for turning out all kinds of iron work, machinery and repairs, in an expeditious and workmanlike manner have been fitted. The workshops are under the constant supervision of skilled and experienced European engineers. There is a fitting shop, a boiler-maker's shop, a blacksmith's shop, and a foundry. The Engineer-in-Chief is now engaged in the fixing of a huge electric plant, 21 boilers of 30 tons each (nine at Tongshan and twelve at Linsi) for power and lighting purposes. Four of these boilers have already arrived. The tour of these workshops under the guidance of the Engineer-in-Chief proved to be both pleasant and instructive. The presence of this great colliery has brought a good deal of money to the people, and the little village of Tong-shan, through which we passed from the train *en route* to the coal mines in Peking mule carts, had quite a prosperous appearance. The miners all seemed to be enjoying the luscious melons, to which, perhaps, a peculiarly acceptable flavour had been imparted by their grimy fingers.

The mail train from Peking had had two extra cars attached to provide sleeping accommodation for the party, as it was feared that the resources of the foreign staff of the Company would not be equal to the occasion. Such fears, however, were groundless, as the whole of the party were speedily taken possession of and hospitably entertained.

We were awakened the day after our arrival by the colliery steam whistle at five o'clock. This whistle is used to call the miners, many of whom work in their fields distance from the mine, to get ready some to descend at six o'clock. It was not until considerably after nine o'clock, however, that we were actually on our way to make the descent.

Having divested ourselves of our ordinary garments, we proceeded to don the suits provided for us of which, perhaps, from an æsthetic point of view, the less said the better. They were certainly unsightly and not exactly good fits, but they were just as certainly what were requisite for the work to be done. Thus attired we entered the cage and commenced the descent of No. 1 shaft which is 600 feet deep. It usually occupies but a very few seconds to reach the bottom, but on this occasion, by reason of our inexperience, the speed was considerately slackened. In due time we reached our destination, and found ourselves in a world altogether unfamiliar to us. It was gratifying to learn that no accident of any very great importance had ever taken place in the mine. Lives had been lost, it is true, and men had been injured from time to time, but in most cases these were due to the characteristic indifference of the Chinese miners and their carelessness in neglecting to avail themselves of the safeguards provided for them. On one occasion a miner in the cage, not making use of the safety belt, fell a distance of six hundred feet and was dashed to pieces. Miners have lost their lives also through their failure to make use of the "props" provided to hinder the coal from falling and crushing them. But, as we have said, the mine has been exceptionally free from serious accidents. There are several Belgian miners employed in the mine, from whom we learned that as compared with those in Belgium there was more water in this one. Certainly one is impressed with the great quantity of water that is being ceaselessly brought to the surface by the huge pumps, and wonders whether the quantity is not greater than that found in many mines in other parts of the world. The electric installation which is to be completed in October next will facilitate a great deal the pumping of water from the mine, and so remove that which is at present a hindrance to the work.

The Tongshan mine is about two miles long from east to west and extends, perhaps, one thousand feet north. There are thirteen seams of coal, which, if one may judge from the No. 9. seam which was visited, are very rich. We understand that the galleries are wider than is usually the case in Belgian mines, which gives greater freedom to the miners and enables them to carry on their work with less danger than would otherwise be the case. We found, with here and there an exception, that there was an abundance of fresh air in the mine and little or no inconvenience was caused by the high temperature. The scene was a weird one as we slowly wended our way through the seemingly interminable galleries, under the leadership of an experienced Welsh miner. Through slush, with the water trickling down the sides of the mine or dripping from the roof, which in some places was so low as to make it impossible to walk in an upright position, we plodded on, carrying our Davy lamps. Every now and then we had to keep close to the sides as the rattling noise warned us that a mule dragging three or four coal cars was approaching. The Chinese miners presented a weird sight as they gradually came in view emerging from the gloom, crouching in the cars. There are about 250 mules underground where they remain until sickness necessitates their being brought to the surface. There are in addition, another 200 mules employed outside the mine. A visit to the underground stables showed that every care was taken of these useful animals. One very interesting object in the No. 3 level visited by us was the main pump (Moore's patent) which pumps the water brought up from No. 6 level, which is 500 feet deeper and conveys it to the surface of the mine. It was generally agreed, after about one hour had been spent in the mine, that a return to the outer world was desirable and the first glimpse of the light of day as we gradually neared the mouth of the pit was a very welcome sight. Begrimed and perspiring we stepped from the cage, well satisfied that we had ventured down the mine, but still more satisfied that our experience was a thing of the past.

We have already said that coal mining is only one branch of the Company's great enterprise, and it is to be regretted that there was not sufficient time to look more closely into what is being done in other directions. Between forty and fifty Europeans are employed at Tongshan. There is a Club and a race course, as well as other indications of advancing civilization and progress, and as the mine develops and the number of foreigners increases, the place promises in the near future to become an important one. The surrounding country is pretty enough, although, of course, the dusty and grimy appearance inseparable from coal-mining districts is to be found here also in the immediate vicinity of the mine.

Both at Tongshan and at Chinwangtao ovens have been installed for the production of coke, which, as the coal is bituminous, is of very good quality. The brickfields are capable of turning out about one million square firebricks per month, the fireclay obtained in the district being of very good quality. There are also large cement works, the raw products used in its manufacture being found in unlimited quantities in the vicinity of the works. A private telegraph service has been established between Tientsin and Chinwangtao, and arrangements have been made with the Chinese Telegraph Company of Tientsin to transmit messages received over the Company's lines for the special benefit of travellers who pass through Chinwangtao.

It affords us great pleasure, in conclusion, to acknowledge the kind courtesy and consideration we received from all connected with the Company with whom we were brought into contact. No efforts were spared to make the trip a delightful and enjoyable one, and public recognition of the fact is only what is due to the Company. The reception accorded the representatives on their return, when they gave expression to these feelings, must have been gratifying to those present who had made the arrangements for the trip and through whose forethought and efforts it was so successfully carried out.

IWAHIG PENAL COLONY

There have been set aside as a penal reservation 22,000 acres of land in the Province of Palawan, extending from the harbor of Puerto Princesa up the stream known as Iwahig which cuts the reservation in two The land is rich, fertile, and very little of it has been cleared although a few scattered settlements, title to which has been taken over by the Government, have been inhabited for some years. The land grows good quality of corn, rice, tobacco, sugar, hemp, copra and cacao. Within a reasonable distance there are extensive forests of fine woods. The best bejuco of the Islands comes from Palawan and is now shipped to Singapore, thence to Hongkong and thence to Manila.

In November, 1904, a plan for a penal colony was gotten under way and a gang of prisoners sent down to begin construction of barracks. There are now barracks capable of holding 650 men, superintendent's house, store house, prison, police house, hospital, etc. The construction is of temporary material, bamboo, etc. The number of prisoners now in the settlement is 500, mostly able-bodied men. There are no women there. Twenty-five additional prisoners go down on each boat. Three hundred and fifty acres are now under cultivation. The colony is by no means self supporting. Supplies of all sorts are still sent in great quantities

Captain John R. White of the Constabulary has been selected to take charge of the Penal Colony and to place it upon a new, and it is hoped more progressive, basis.

The general plan of Commissioner Forbes is to divide the reservation into three zones, one of which will be occupied by men in barracks who are to be under fairly close supervision although unguarded; the second to be occupied by men in homes who work for the benefit of the Government and who are allowed to have their families; and the third to be known as the free zone where prisoners who have obtained their freedom conditional upon living for a period of years in the settlement or who have obtained their freedom and wish to remain there, may be alloted sites on which to settle.

The general plan is to compel each prisoner in the settlement to do a given amount of work and by doing this work to earn his way through successive stages, as boys do at school passing from class to class, in each stage having wider privileges, more freedom and better opportunity By this means it is believed that a continual incentive for work will be supplied. The minimum of labor required must be performed under penalty of failure to receive promotion, and for continued failure, of returning to Bilibid Prison. Confinement in the settlement prison will be another penalty for local offenses. By this means it is hoped that an intelligent education can be given the prisoners in agricultural employment and an opportunity given them to improve their position and attain their freedom. The plan gives a sort of self-government to the prisoners by which they will l their own council and their officers and select their own policemen who will be charged with the maintenance of order and seeing that their fellows observe the rules and regulations of the settlement. This plan is already partially in effect and it is a source of great pride to the members of the colony to be selected as members of the police force and allowed to wear the insignia of that office.

The plan will be to plant the natural products of the soil and raise them for the maintenance of the settlement and an effort will be made to make it self-supporting. The settlement can grow a good quality of corn, rice, hemp, tobacco, cacao, and cocoanuts and it is expected to plant these in sufficient quantities to support all of the prisoners and the settlers and to yield a sufficient return to pay for the necessary improvements which will be made from time to time.

It is expected that prisoners and their families of the home zone and free zone will each have a five acre lot of land which they will be required to cultivate, and in these zones the settlement will take the products of the different farms and give a reasonable price to the settlers so that they can have the advantage of the central bodega and means of transportation.

It is also expected to put these prisoners of the home zone on a co-operative basis so that a share of what they produce will be paid to them in cash, and thus an additional incentive be given them to work.

It is also expected that as the production of the settlement increases, modern machinery will be installed and an effort made to use the labor therein to the best advantage, as would be done in some first-rate industry.

There are now confined in Bilibid 3,500 prisoners which is a reduction of one-half over what there were about two years ago and which has relieved the great congestion of that place. Half of this reduction has been made by the transfer of prisoners to the settlement and there are now 500 of them there and over a hundred at work on public works at Puerto Princesa. It is expected to send 2,000 prisoners to the settlement and it is believed that a considerable portion of long-term prisoners, who are not criminally incorrigible, will have an opportunity to work out their sentences in this way. This plan has the double advantage of being healthy and advantageous for the prisoners and will eliminate a part of the criticism which has been leveled, with more or less reason, by merchants against the competition which the prisoners create by reason of their manufacturing now carried on in Bilibid. It is the desire of the administration to reduce this feature to the lowest possible limit, and yet it is unhealthy for men to be confined without any useful employment and the results are so advantageous to the prisoner in teaching them some useful trade, and, moreover, the expense to the community is so great in maintaining the prison that it will be necessary to maintain, in a small way, the manufacture of certain articles which will serve two purposes: namely, that of educating the prisoners and of repaying part of the expenses of the prison



IWAHIG PENAL COLONY

CUTCH

(Continued from page 133)

Quality of Leather Produced by Mangrove Bark.

Reference has already been made to the dark-red color of the leather tanned by mangrove bark or extract, and to the fact that this color depreciates its value. Apart from this defect, mangrove tanned leather when properly made seems to be fair quality and suitable for shoe leather and similar purposes. On this point Professor Proctor, of the Leather Industries Laboratories of the Leeds University, says that "mangrove bark is now largely used in conjunction with pine oak and mimosa barks, and that extract prepared from *Ceriops Candolleana* makes good but dark-red leather;" and Professor Körner, of the Freiberg Tanning School, as the result of his experiments on the value of mangrove extract as a tanning agent, states that "it yields a soft and pliant, workable leather, which, however, possesses an objectionable red color, which can only be modified sufficiently for commercial purposes by using it in conjunction with myrobalans, valonia, sumach or similar light-colored tanning materials.—*Bulletin of the Imperial Institute.*

CHINKIANG INDUSTRIES

The commissioner of customs at Chinkiang, in his report on the return of trade for that port for the year 1905, says:

"The year's trade, measured by its net value, falls but a trifle short of its predecessor, and may be considered one of average prosperity. Commerce as a whole was moderately profitable, though the Cantonese merchants complain of a bad year, largely owing to stringency of money through overspeculation in the south. Crops were fairly good, and agriculturists were enabled to realize a sound profit by the removal of the restriction on the export of grain.

"Work was begun on the new Shanghai-Nanking railway in the early spring, and a large number of coolies were brought down from Shantung as laborers. On September 1, 1905, the first sod of a tunnel 1,700 feet long, under Pao-kai-shan, a hill on the border of the British concesssion, was cut by the Chinkiang Taotai, in the presence of the principal local officials and members of the foreign community, and considerable progress has been made in the construction of the line.

"A scheme for bunding and reclaiming the large area of silted foreshore of the river was made public early in the year, with the approval of the viceroy, the levy of wharfage dues being an essential element of the proposal.

"In October electric light was introduced into the extensive Chinese suburb between the British concession and the city. The credit of its introduction is due to the enterprise of a remarkable individual, Mr. Chang Chieng, a native of Tungchow, in this district, who having, when in humble circumstances, won the highest and most coveted literary rank of chuangyuan, or optimus, in the palace examination, has employed the influence so acquired in promoting the manufacturing industries of his native town and vicinity. He is an ardent supporter of the principle that China can and should manufacture for herself the fabrics now imported in such enormous quantities from abroad, and, having no capital of his own, he has had the ability to convince men of high position and wealth to entrust him with means of putting his views into practice. The extent of his enterprise may be judged from what follows:

MANY MODERN FACTORIES.

"At Tang-chia cha, a suburb of Tungchow, with water communication to the Yangtse, there are already established and at work a cotton mill of over 40,000 spindles for fine yarn, with English machinery, employing 2,500 hands, and capable of turning out 30,000 bales annually, for which a good market is said to be found locally. In the other mills there is machinery of German, American, Japanese, and some of Chinese make. There is a mill for extracting oil from cotton seed, the waste product of which also finds a good market as a fertilizer; a flour mill with a capacity of 7,500,000 pounds annually; a dyeing factory for cotton and silk fabrics; a factory for spinning and weaving silk; a canning factory for meat, fish, etc., and what will eventually be a dockyard for building steam launches and their machinery, but has at present only the plant for boiler making. Just outside of Tungchow there is a printing establishment for books and maps. In the vicinity is also a soap factory. On the island of Tsungming, on the Yangtse, under the same management, there is a cotton mill and a large brick factory, the latter at present employed in supplying bricks for the numerous buildings still in course of erection. In addition to these 11 establishments 19 more are projected or in course of erection; among them a cotton-weaving factory is already sufficiently advanced to admit of the instruction of mill hands who will later carry on the work. All the factories are well built, worked by steam power, and lighted by electricity. Mr. Chang has also an interest in the Chinkiang flour mill, which produces a brown flour pronounced by a foreign analyst pure and nutritious, and which, as I have found, makes excellent bread. The produce of the Tungchow mill is of like quality. Old-fashioned millstones, turned by steam power, are now used, but steel rollers are to be introduced. I am informed by a Chinese gentleman, who is well acquainted with all the above enterprise, that their textile fabrics are not equal to those of European, American, or of Japanese mills, but that they are cheap and find a ready market among the Chinese. It is expected that the quality of the manufactures will improve with the growth of experience and skill.

"The waterways, which spread net-like over the surrounding country, are for the most part navigable by small launches, of which Mr. Chang has half a dozen, and he has already done something to facilitate their movements by the building of a fine quay of some 1,500 feet at Tangchiacha. He has also constructed a bridge there 200 feet long over the Liho; is making lock gates on the creek between Tangchiacha and the Yangtse, otherwise rendered impassable by difference of level, and he has acquired a dredger wherewith to deepen the numerous shallows in the canals. He will shortly have two small steamers running on the Yangtse between Tungchow and Nanking."

YALU VALLEY TIMBER DEVELOPMENT

Consul-General J. E. Jones, of Dalny, writes as follows concerning the concession given in the treaty between Japan and China for the formation of the Japan-China Timber Company for exploitation of timber in the Yalu Valley:

"A short time ago two Japanese timber experts visited the locality and made a careful estimate of the available supply and probable cost of handling. One of the details of the enterprise is the rafting of the timber, and their estimate of the probable cost of a raft of 500 trees is $183 for labor of felling trees and making raft, $76 for sustenance of laborers employed, $13.50 for 3 raftmen, $40 for 10 carriers, $24.50 for sustenance of raftment and carriers, $30 for hire of 1 ox, $73 as recompense to contractors 20 per cent of expenses. The selling price of raft is figured at $660, leaving a net profit of $220 or a total profit on 3,000 rafts per annum of $660,000. The business expenses are set down at $54,400 and establishment expenses at $159,000. This report is submitted as bearing upon the general idea that, so far as possible, it is the purpose of both Japan and China to control the enterprises in Manchuria, to the exclusion of the foreigner."

CHINESE RAILWAYS

NEW FUKIEN LINE.

Harry L. Paddock, the new consul at Amoy, makes his first report, stating that the long-projected Fukien Railway is at last becoming an assured fact. He writes:

This Fukien Railway will penetrate both the northern and southern parts of this province and will extend about 1,000 miles. Land is being acquired at various points along the proposed route and work will be commenced here. The Amoy terminus will be located on the mainland known as Sung Su, which faces the city and is about 1½ miles distant and about 1 mile from the international settlement of Kulangsu. This line will be built to Changchew, whence a southern line will be built through Chao Chow and on until it connects with the Kuang Tung Railway; from Changchew a norther line will be built through Chuan Chew and Hsing Hua to Foochow. From Foochow the road will further be extended to Yen-ping, whence one branch will be built to Kien-ning and another to Shao-wu, in order to connect with the Chekiang and Kiangsi railways, respectively.

This is the present proposed line of railway and indications would go to show that immediate steps are to be taken to consummate the plan. At least the line between Amoy and Changchew has been decided upon and work is to commence immediately under Mr. Chen, commissioner of railroads for this Province. The rivalry between France and Japan for the control of the new railroad is decidedly marked, and the rolling stock and railroad supplies will no doubt be furnished either by French or Japanese firms. There is an opening for American railroad engineers in this Province, provided prompt action is taken, but at present French control is decidedly marked. Whether American supplies can be introduced at this late date or not is a matter more or less problematical so far as this particular line is concerned, but it is at least worth trying.

Improvement in the methods of travel is one of the results of the present progressive movements in China, and railways are being projected in many quarters. At present the only engineers in this port are either Japanese or French, who are on the ground and consequently in a position to control the railway movement. If American firms intend to avail themselves of this opening market, it would be advisable to have some energetic representatives on the field at an early date.

SOUTH MANCHURIAN LINE.

Plans to guarantee construction.

Consul-General John E. Jones, of Dalny, reports that during the consideration of the subject of financing the South Manchurian Railway a proposition was made for the Japanese Government to guarantee the interest upon the investment for a period ranging from three to five years.

This, it was urged by the supporters of the measure, would be an additional incentive to investors and expedite improvement of the road. It is stated in Tokyo now that the Government will not guarantee any interest, and that the method adopted will be this: A valuation will be made of the line as at present constructed, as well as the appurtenances thereto and the mines along the road. The sum total of these will represent the Government's interest in the road. Following this, a committee of railway experts will carefully estimate the amount necessary for improvements, which will include the new construction incident to a change of gauge, additional rolling stock, depots, etc., and for this amount the general public both of Japan and China, as well as the Governments of each, will be asked to subscribe. This will represent the general capital of the road.

It is then proposed to have the auditing committee go over the accounts of the road at stated intervals and whatever net profits remain will be applied to paying a 6 per cent interest on the general capital only. The Government stands aside, in other words, until the shareholders are paid, and then if there is any surplus it participates in the remainder. Thus it appears that shareholders in the new South Manchurian Railway will be "preferential shareholders" and that they will be virtually guaranteed a 6 per cent return.

KEYSTONE DRILLER CO.

We invite the attention of our Eastern engineering firms to the advertisement of the Keystone Driller Co. of Beaver Falls, Pa., U. S. A. This firm is one of the best known manufacturers of drilling machinery in the world and is desirous of placing two or three agencies in this field.

THE PIONEER ROLL PAPER CO.

This enterprising company of Los Angeles, California, which has forged to the front as manufacturers of prepared and ready roofing, is reaching out for the Oriental trade. Mr. H. U. Robbins, their special representative, is now in the East, and will visit all the ports in China and Japan, and afterwards Manila. Interested parties wishing prices, samples, and other information, can address Mr. Robbins, care of the FAR EASTERN REVIEW, Manila.

CONSTRUCTION AND ENGINEERING NEWS

ELECTRICAL.

ELECTRIC POWER FOR CALCUTTA.—It is reported from British India that a scheme is being developed for the supply of electric power to the mills and factories along the Hooghly, the area served extending 25 miles to the northward of the town of Hooghly and 17 miles southward to Budge Budge, a total distance of 42 miles, embracing practically the whole of the works of the Calcutta district, which at present use over 100,000 hp. Besides power for industrial enterprises, electricity will be supplied in bulk to distributors and for electric traction and for lighting the premises of those using the power supply. It is not proposed to sell energy within the limits of Calcutta and Howrah, which are covered by the Calcutta Electric Supply Corporation; but trunk mains will be laid through these areas. The draft license asks for the adoption of two systems of supply—a two or three-wire direct-current supply at a pressure not exceeding 600 volts between the outer wires, and a single-phase or polyphase alternating-current supply at a pressure not exceeding 10,000 volts. The capital of the company which it is proposed to form has been provisionally fixed at $1,500,000, and will be issued in London; but the prospectus is not likely to be ready for some months at least.

ELECTRIC RAILWAY SCHEMES, INDIA.—The Government of India have under consideration two schemes for the working of railways by electricity, one in Northern India and the second in Southern India. The former is the Abbottabad *viâ* Domeli and Baramula to Srinagar Railway which is to be on the 3 feet 3½ inch gauge with a length of 160 miles, and the latter is the Nilgiri Railway-cum-Coonoor-Ootacamund extension. Major Joly de Lothinere, R. E., the designer of the Cauvery Falls Electric Works in Southern India, has been preparing the scheme for the Srinagar Railway, while for the Nilgiri-Coonoor-Ootacamund Railway the electrical scheme has already been investigated and the estimate is under consideration. There has been some talk of the electrification of the Kalka-Simla Railway also, but that project is believed to be in the distant future though the prospects of the scheme are considered to be more favorable now that the Government have taken over the line from the company which constructed it. Another mountain line, which may also come to be worked by electricity, is said to be the Rawalpindi-Murree Railway, proposals for the construction of which on the 3 feet 3½ inch gauge with a length of 40 miles are under the consideration of the Government of India.

STEAM TURBINE IN SIAM.—One of the most progressive of the independent principalities of Asia is the little kingdom of Siam, on the Indo-Chinese Peninsula. In the principal city, Bangkok, is a modern electric railway power plant, operated by the Siam Electricity Company and equipped with reciprocating engines and generators. Because of the increased demand for power, an additional unit has become necessary and a Curtis steam turbine has been decided upon as most suitable. This is a 500-kilowatt 375-volt machine, built by the General Electric Company, of Schenectady, N. Y. The boiler plant for this station is unique in that paddy husks are burned in place of coal. The fuel is brought down the river from the rice field in flat-bottomed boats to the power-house and unloaded directly into the boiler-room by an elevator and belt conveyor, operated by several direct-current 500 volt General Electric Company motors of the CE type. This method of using rice husks for fuel is an economic utilization of a waste product similar to the use of the crushed sugar cane, bagasse, on sugar plantations.

AMALGAMATION OF TOKYO TRAMWAYS.—The Tokyo Street Railway, Electric Railway, and Electric Car Railway Companies have agreed to amalgamate. The Boards of Directors at first appointed Baron Shibusawa and Mr. Makoshi as arbitrators and promised to submit to their decision regarding the terms of amalgamation. The decision was as follows:—

An amalgamated Company shall have 340,000 shares (the total number of shares of the three Companies). The shares shall be distributed as follows:—The Tokyo Electric Railway (at present 120,000 shares) to have 90,000 shares, the Street Railway (300,000) to have 312,000, and the Electric Car Railway (120,000) to have 138,000. In other words the Tokyo Electric Railway Company is to give up 30,000 shares, which shall be divided between the Street Railway and Electric Car Railway at the ratio of 4 to 6, that is, the former receiving 12,000 shares and the latter 18,000.

The decision was accepted. Meetings of principal shareholders were held at the respective Companies' offices on the 5th of June. The Tokyo Electric Railway and Street Railway's shareholders approved of the agreement, but there were a few dissentient voices raised by the Electric Car Railway's shareholders.

These three Companies convened general meetings of shareholders on the 28th of July when the question was submitted. The Tokyo Street Railway and Electric Railway Companies accepted the proposal on the condition that in case the Home Office should refuse to sanction the assignment of the Companies' rights or should alter the Company's charters into more disadvantageous ones on account of amalgamation, the provisional agreements should be annulled. The Home Office, however, is likely to sanction the amalgamation.

The directors of these tramway Companies met on the 30th ult. and decided that the new Company will have its head office on the present premises of the Tokyo Street Railway Company. They also appointed a committee of four to form the new Company.

NEW ELECTRIC RAILWAY, JAPAN.—An application has been sent in to the Government by Mr. Yasundo Hotta of Kyoto, Mr. Neiken Aizawa of Fukushima and others through the hands of the Governor of Gifu Prefecture for permission to construct an electric railway to connect Gifu station in the Tokaido Railway with Toyama in Etchu Province, viâ Takayama, Hida Province. The promoters propose that the railway shall have a capital amounting to 20 million yen.

THE TOKYO ELECTRIC LIGHT COMPANY.—This company has under construction the largest water power station in Japan, and, in carrying out its extensive plans, has placed large orders for miscellaneous electrical apparatus. With the exception of the water wheels and generators, which are of German manufacture, all the main station apparatus was ordered from New York. At the sub-station the voltage is reduced by transformers and distributed underground to various smaller stations within the city, and the Tokyo Electric Light Company has just ordered 250 kilowatt transformers and 78 single phase potential regulators, as well as switchboards and auxiliary apparatus.

MADRAS ELECTRIC TRAMWAYS.—The statutory return of the Madras Electric Tramways Company (1904) to April, 1906, shows that the capital is £100,000 in 25,000 preference shares and 75,000 ordinary shares of £1 each. Of the ordinary shares 71,007 has been taken up, £1 per share has been called up on 1,007 shares, the 70,000 remaining shares being considered as fully paid. The mortgages and charges are returned at £50,000.

HYDRO-ELECTRIC SCHEME, JAPAN.—Messrs. Kijuro Ito, Yohei Matsuyama and 10 other businessmen of Osaka are organizing a water-power electric company with a view to laying out an electric railway between Doton-bori, Osaka, and the summit of Mt. Koya. The organizers have decided to establish their office at Shio-nibashi Station, of the Koya Railway.

NEW CABLE, JAPAN.—The laying down of cables between the Bonin Islands and Kawasaki, seven miles south of Tokyo, which had been undertaken by the Imperial Government was completed in the latter part of last month, thus effecting a connection with the American cables.

WIRELESS TELEGRAPH, CHINA.—Prince Suh has suggested to the Government to erect wireless telegraph stations at Wuchow, Hankow, Anching, Wuhu, Chinkiang, and other places along the Yangtsze.

ELECTRIC TRAMWAY EXTENSION.—The Yokohama Electric Tramway Company has decided to send in an application for official permission to extend the present lines to Nagashimacho via Horaicho along Ookagawa canal, preparatory to further extending the line to Kamakura.

ELECTRIC LIGHT, MUKDEN.—A Tengtien report states that Chinese and Japanese merchants have jointly formed an Electric Light Company at Mukden in accordance with Board of Commerce Regulations, and will instal electric lights in that city some time next month.

ELECTRIC LIGHT, KONGMUN.—The Chinese community here is inspired by the amount of profit made by the Canton Electric Company, and a movement is now on foot for the introduction of electricity into this City. A prospectus has been issued for the formation of a company with a capital of $100,000. So far one-third of the capital has been subscribed, but it is not proposed to move until the whole capital has been underwritten.

THE AMERICAN KOREAN ELECTRIC COMPANY.—This company is extending its track from the West Gate to Mapo. The line is only about three miles in length but includes a rather stiff hill where some grading will have to be done. The new branch will be open within two months.

ELECTRIC LIGHT, HANKOW.—The waterworks and electric light works at Hankow are being undertaken by the Chinese Authorities with success thus far. The sum of Tls. 800,000 has been advanced by the Government Bank, and the public are to be invited to subscribe to the shares which are to be Tls. 100 each. All necessary plant has been ordered from Germany.

TOKYO ELECTRIC LIGHT CO.—The terms of a foreign loan contracted by the Tokyo Electric Light Company are said by the *Tokyo Asahi*, to be as follows:—Amount £500,000, interest 5 per cent., issue price £92, and term of redemption 15 years. The money will be spent on the water power electricity stations on the Katsuragawa, which work will be completed by July, next year.

ELECTRIC RAILWAY, JAPAN.—A plan is on the tapis at Kumagai for the construction of an electric railway between Ashikaga, Shimozuke province, and Ota, Kozuke province, a distance of 15½ miles.

TELEPHONES, JAPAN.—Within the current fiscal year telephone exchange business will be opened first in Kofu, Otsu, Wakayama, Utsunomiya, and Takasaki; then in Shizuoka, Gifu, Toyama, Nagaoka, and Kagoshima, and lastly in Tsu, Himeji, Takamatsu, Tokushima, and Nagano. The government will also start the construction of the telephone connection between Tokyo and Fukushima in October next.

WIRELESS TELEGRAPHY, TIENTSIN.—A German company is reported as erecting wireless telegraph poles at Tongku with the object of making some experiments with Tientsin.

ELECTRIC LIGHT PLANT, C. E. & M. CO.—The S. S. *Yunnan* brought out the new electric plant for the C. E. & M. Co., Ltd.

RANGOON WATERWORKS BONDS.—The financial position of the Rangoon Municipality is said to be serious. "At the present moment the town is indebted to two banks in respect of loans for waterworks and drainage to the extent of Rs. 11,400,000; against this heavy liability there is a sum of Rs. 585,990 in 3½ per cent government securities in the Sinking Fund. Consequently the net liability chargeable against Municipal funds with the new loan now needed will leave Rangoon in debt to the extent of a little over one crore thirteen and a quarter lakhs of rupees."

MOULMEIN WATERWORKS.—We hear that the Municipality have submitted its application for a loan of Rs. 100,000 in connection with its Waterworks. Out of this sum Rs. 80,000 is meant to repay the Government to this extent for having paid Messrs. Burn & Co., in settlement of their bills against the Government for constructing the Waterworks, this settlement having been come to without any reference to the Committee. The balance of Rs. 20,000 is required for repairs to service cistern, fencing in the catchment area, etc.—*Moulmein Advertiser.*

KRIAN IRRIGATION, F. M. S.—The Krian Irrigation Scheme has been completed at a cost of $1,600,000. The work was commenced in 1899. In spite of innumerable difficulties, one of the greatest pieces of engineering work in the Far East has been successfully accomplished. There are now 70,000 acres of land available for paddy planting without any fear as to failure of the water supply. At the ceremony of opening the six sluice gates of the Main Canal on Wednesday last, Mr. E. W. Birch, C. M. G., Resident of Perak, spoke of the able manner in which the work had been carried out, and expressed his appreciation of the assistance given by the Hon. Colonel A. Murray, Colonial Engineer, Straits Settlements.

CANTON WATER WORKS.—It is reported that the order for the machinery for the new waterworks has been placed with Messrs. H. M. Schulz and Co. of Shanghai, and the pipes have been ordered from the Kiangnang Arsenal. The company has already begun the construction of the water-basins and filter-beds.

BANGKOK WATER SYSTEM.—The Siamese War Department advertises that tenders are required for the supply of W. I. & C. I. pipes together with various accessories for the erection of Water Supply System.

CHEMULPO WATERWORKS.—In connection with this expensive and uncalled-for scheme it appears that the Finance Minister and a number of Japanese have been inspecting the bank of the river opposite Seoul where the intake is to be constructed. Some 50 houses and 60 graves have been ordered to be removed but the owners, who have observed the fate of their friends across the river are demanding their money first.—*Korea News.*

IRRIGATING PUMPS, JAPAN.—The inhabitants of the united villages of Niikawa, Ohama, Tanao, and Asahimura, in Aomi district, Aichiken, have installed in that district the Worthington centrifugal pumps for the purpose of irrigating an area of land which is 36 feet above the source of water supply. The pumps cost 37,900 yen, and the land thus irrigated measures 335 cho in area. The measure, which has already proved a success, will double the producing capacity of the district.

WATERWORKS, SWATOW.—Siu King Shan and twenty-three other capitalists have commenced raising funds for the works, and applied to the Board of Commerce for registration. The date for commencing the work has been reported to the Viceroy for protection. The way of raising subscriptions is in accordance with the commercial regulations, under the supervision of Shuns Yau Shi, and is exceedingly satisfactory.

THE SEWERAGE OF TOKYO.—The *Jiji* once more urges upon the city authorities the necessity for constructing a decent sewerage. The present system, or rather want of it, together with the microbe-breeding gutters, ditches and moats, is highly detrimental to the health, and, in every respect, unworthy of the great capital.

BRIDGES.

YANGTSZE BRIDGE PROJECT.—Viceroy Chang Chi-tung is contemplating the erection of iron bridges to connect Wuchang and Hankow, and to connect Hang-yang and Hankow, to replace the ferry boats. One bridge would be over the Yangtsze and one over the Hsiang. The bridges will also serve as connection between the railway lines north and south.

YALU RIVER BRIDGE.—According to the *Japan Gazette* the work of bridging the Yalu has been under investigation for a long time. All arrangements as to spans have already been concluded and the work will be commenced after practical investigations by the engineer concerned. The bridge will be a 16-spanned one about 3,400 feet in length. It is little shorter than the Tenryu bridge on the Tokaido Railway and almost equal to that over the Oji river on the same railway. The Yalu bridge will be about 40 feet above the normal surface of the river, as it is to be constructed in anticipation of floods and in order to allow junks sailing beneath.

CANTON BUILDINGS.—Work on the pile foundation for Messrs. Arnhold, Karberg and Co.'s new building on Front Avenue is being pushed ahead.

The old two story building, used since 1879, has been removed to give place to the new structure. This building is to be a six-story reinforced concrete structure with up-to-date appliances, such as elevators, sanitary fittings, etc. The exterior walls are to be faced with ornamental brick and granite.

The ground floor is to be used as a godown and machine display room, while the floors above will be used by the firm for office and residential purposes. A roof garden will be a feature of this place while the back portion of the roof will be used for servants' quarters, kitchen stores, etc.

CUSTOM HOUSE.—The I. M. Customs buildings, one for the indoor staff and the other for the outdoor staff, are well under way. These buildings are of a very substantial character, and will add much to the architectural beauty of Shameen. In fact, the former building will cover more ground area than any other single building on Shameen, and with the single exception of Messrs. Arnhold, Karberg and Co.'s new Hong will be the largest Shameen building. It will be handsomely finished in hardwoods, and will be of brick, steel and concrete construction.

The building upon completion will be occupied by married assistants of the Customs, on the Western side; and unmarried assistants on the Eastern side, together with the entire third floor, and the completion is being looked forward to by them with considerable pleasure.

Our local architects, Messrs. Purnell and Paget, have these three buildings in hand, and we are sure these will add still further to the many landmarks in Canton of this firm.—*S. C. Morning Post.*

FEDERATED MALAY STATES RAILWAYS.—1. Tenders are invited for the supply only of the Iron and Steel work in connection with a dome, etc., for the tower of the Terminus Building in Penang.

2. The General Condition of Contract, Specifications, drawing and forms of tender and agreements may be seen and all other particulars may be had at the office of the General Manager for Railways, Kuala Lumpur, Divisional Engineer, North, Taiping, and the Foreman, Terminus Building, Penang.

3. Tenders must be upon official forms and delivered in sealed covers addressed to the General Manager for Railways, Kuala Lumpur, and marked "Tender for Steel Work for Tower," on or before the 3rd September, 1906.

4. The Government does not bind itself to accept the lowest or any tender.

BUILDINGS, TSINGTAU.—An official report, states that during last year active building operations were carried out at the port of Tsingtau. 54 European residences, 26 mercantile buildings including a soap factory and three steam kilns, 12 godowns, and 11 Chinese residential and business houses were erected.

NEW CLUB HOUSE, TIENTSIN.—The New German Club house in Wilhelm Strasse is fast approaching completion. The heavy stone fronting and interior ironwork have been most judiciously utilized for solidity and strength, without producing the effect of over-massiveness.

NEW CATHEDRAL, RANGOON.—The Consulting Architect to the Government of India has given high and deserved praise to the work on the new Roman Catholic Cathedral, Rangoon, which he thinks the finest masonry building in India. The wonderful part of it is that except the builder, a Roman Catholic priest from Europe, the workers are all Indians trained by himself without any other supervision. The place is well worth a visit by those interested in buildings. Not only the construction, but the mode of carrying out the work, are said to be well worth the study of those concerned with like undertakings.—*Indian Engineering.*

STEEL WORKS, JAPAN.—As a site for the proposed Japan Branch of Armstrong and Co., there has been purchased an area of some 20,000 "tsubo" (one "tsubo" 3.953 square yards) at the mouth of the Sakaigawa, near Hiratsuka. The expense of the wooden fence around the grounds alone is said to have reached Y. 20,000. Upon the completion of the proposed factory it is expected to take the lead in its line in this country, and to meet every demand. It is said that the Japanese Government has included in the contract with the Company the option of purchasing the branch after a certain term of years.

STEEL WORKS, TAIRIN, (DAIRY).—An Osaka report states that several prominent business men in Tokyo and Osaka contemplate establishing an iron foundry in Tairen with a capital of 30 million yen. Some experts will shortly be dispatched to Tairen with a view to carrying out the necessary investigations. The foundry will get its coal from Fushun and its ore from Taya, and produce mainly rails and materials for shipbuilding.

STEEL AND IRON WORKS, JAPAN.—The Meiji Iron-works Company to be organized by Messrs. Hakamada & Yamagashi will have a capital of 500,000 *yen* and establish its workshops in Tokyo and Naoyetsu. The total is divided into 10,000 shares, of which 6,500 shares will be offered to the public for subscription.

GUN FACTORY, NEAR BAIKAL.—A St. Petersburg telegram of July 11, which is published by the *Asahi*, states that the Russian government is making arrangements to establish an arms factory east of Lake Baikal for the purpose of supplying the troops in the Far East.

HUANGPOO CONSERVANCY.—An agreement, between Taotai Jui and Commissioner Hobson, who [illegible] Conservancy Board and the engineers to be employed will be nominated by Mr. de Rijke but with the consent of the Conservancy Board. The term of the agreement is three years counting from the 7th June, 1906, and six [illegible] to renew the agreement in case the works shall not be completed within three years, and such extension of the term of the agreement shall not be over two years and further extension shall be made if necessary in a similar manner. The office and residence for Mr. de Rijke will be provided by the Chinese Government, but if Mr. de Rijke has a residence for his family of his own accord such shall be paid by himself. During the term of the agreement Mr. de Rijke shall solely devote himself to the works of conservancy and extra jobs shall not be carried out by him unless with the consent of the Chinese Government. The salary of Mr. de Rijke is £3,000 per year and he will be paid from the 4th November 1905, to the date of agreement at that rate, etc.—*Mercury.*

CHEMULPO HARBOR IMPROVEMENTS.—With reference to the projected improvements at Chemulpo Harbor, it is now stated that arrangements are being made to carry out the work on a large scale.

According to present plans, an area of 42,300 square metres, immediately in front of the Custom House, is to be reclaimed from the sea, and is to form the site of a jetty about sixty ken in length and a landing place of three hundred ken. Ten godowns are to be constructed near the landing place.

WET DOCK, SASEBO, JAPAN.—A plan for constructing a gigantic wet dock is mooted at Sasebo. According to the plan, two islands, in front of the naval arsenal at that port, are to be connected by a break-water, and the inside of the break-water is to be converted into one big wet dock. When constructed, the dock will be able to take in a great number of warships all at once.

YELLOW RIVER CONSERVANCY.—The engineering works on the banks of the Hoangho which are being made to prevent this stream from overflowing have been commenced at a point between Hotang and the provisional telegraph office on the sand-bank in the river.

STEEL TOWBOAT.—The Shanghai Dock and Engineering Co., Ltd., launched on the 6th of August from their Pootung Works the single screw steel towboat *Daisy*, built to the order of Mr. G. McBain for the Mattschappij-Tot Mijn Boschen Landbouwexploitatie in Langkat. The following are the dimensions of the boat:—Length over all 100'; Length between perpendiculars 105'; Breadth 20'; Depth 17'6". The engines are vertical compound, direct acting, surface condensing, having cylinders 16 and 36 inches in diameter by 24 inches stroke. The boiler is a single ended steel cylindrical return tube type, and arranged to burn oil fuel on arrival at her destination.

NEW DREDGE, MANILA.—A new 12-inch suction dredge to be called the Pasig has been launched by the Atlantic, Gulf and Pacific company. The Pasig is a counterpart of the giant dredge Manila with which the company has been prosecuting its lower river and bay work, except for its peculiar adaptability to work, up the river above the bridges under which the Manila could not pass.

The new dredge is equipped with a collapsible house deck and hinged stack which will permit of its passing under the bridges spanning the Pasig and devote itself to work laid out for it up the river.

As soon as it is launched it will start pumping and terraplaning up the river where the company has contracts for filling in the low lands which are often flooded during the rainy season when the Pasig breaks over its banks.

LAUNCH OF THE FUSHIMI.—The launching and christening of the new Japanese shallow draft river gunboat "Fushimi" took place at the branch yard of the Kawasaki Dockyard Co., Shanghai, on Aug. 8.

The "Fushimi" when completed will be the fastest and most powerful shallow-draught gunboat on the Yangtsze river. Her dimensions are: length between perpendiculars, 160 feet; breadth, 24 feet 6 inches; draft, loaded, 2 feet 3 inches; displacement, 180 tons; and her designed speed is to be 14 knots. She was built by Messrs. Throneycroft and Co., in England, and sent out to Japan in sections, and then sent on to Shanghai, where she was put together.

THE MITSUI BISHI DOCK CO.—This company has decided to construct a floating dock of 11,000 tons. The floating dock will be placed at Kobe. The completion of the proposed dock is to be expected about May next and the arrival of the same at Kobe about July.

MOJI DOCK COMPANY.—The application for the establishment of a dock company at Moji has been filed with the Government. The prospectus of the new firm includes, it is reported: capital Y3,500,000; Constructing two dry docks—No. 1, 480 feet long, 60 feet wide, 28 feet deep, suitable for vessels of 7,500 tons; No. 2, 600 feet long, 75 feet wide, 30 feet deep, for vessels of 12,000 tons; accepting orders for shipbuilding of vessels under 5,000 tons. The yards will be constructed at Okubo.

LAUNCH OF THE CHEKIANG.—The Chinese Gunboat "Chekiang" has been launched at the Kawasaki Dock Co., Kobe. This is the third of six sister boats contracted for the Chinese Navy. 200 ft. long, draught 8 ft., displacing 740 tons and intended to travel 13 knots. She carries two 12c.m. q.f. guns, two 12pr. q.f. guns and four maxims.

CHINESE-BUILT LIGHTERS.—The Imperial Naval Yard at Tongku has completed putting together two large light draft lighters which are to be employed in the conveyance of salt at Pehtang, and were constructed in parts in Holland to order of the Salt Commissioner, and arrived some two months ago. These are the first boats of their kind put together in these waters by Chinese.

TORPEDO BOAT DESTROYERS, JAPAN.—During the late war the Naval authorities started the construction of 29 destroyers with a portion of the war expense. So far 22 of them have been completed and the rest are as follows:—The *Shirotae*, *Uzuki*, *Minazuki*, *Nagazuki*, *Kikuzuki*, *Yunagi* and *Matsukaze*. All these destroyers are expected to be launched shortly.

OSAKA IRON WORKS.—A trial run of the destroyer *Hamakaze* built by the Osaka Iron Works, was carried out in the sea of Tenpozan on August 1st, ulto. The vessel ran for one hour at full speed, and was in the second stage of the run, when a cylinder was damaged and she had to return to the works again. She is now being repaired for another trial run.

URAGA DOCK CO., JAPAN.—A general meeting of the Uraga Dock Company will be held on the 18th of August at the Geographical Association building when a dividend will be declared at the rate of 6.5 per cent per annum. The rumor concerning the acquisition of the dockyard by the Government is unfounded.

NEW STEAMERS, JAPAN.—The Mitsui Bussan Kaisha is reported to be contemplating constructing three steamers for its use, each about 3,000 tons.

GUET HAN RAILWAY.—Railroad help wanted by the Kwang-Tung Mercantile Administration of the Yuet Han Railway Company, Limited, in the Kwang-tung section. Chinese civil engineers or engineering students having experience in railroad preliminary, location and construction. Must be capable of handling any kind of railroad instruments on field work.—Address applications, giving training, references, experience and samples of work, to H.E. Chang, President of the Kwang-tung Mercantile Administration of the Yuet Han Railway Company, Limited, Canton.

THE KWANG-TUNG MERCANTILE ADMINISTRATION OF THE YUET-HAN RAILWAY CO., LTD.—Tenders are invited for five first-class, five second class, and ten third-class coaches, two baggage cars and twenty dump cars—capacity five cubic yards. The Coaches are to be the same style as the First and Second-Class Coaches of the Sam-Shui Division, with the exception of the length, which will be 60ft. over end-sills.

The Third-Class Coaches are to be the same as the Second-Class Coaches of the Sam-Shui Division with the exception of the interior finish, and the seats to run longitively—the sides and double-centre seats.

Bidders will be required to state the net cost and time of delivery free alongside the wharf—Wong Sha.

Tenders will be opened in the Head Office, Canton, on the 23rd day of August, 1906, at 11 a. m.

The Company reserves the right to reject any or all tenders.

CHANG TO CHAI,
President.

Canton, August 9, 1906.

CEYLON GOVERNMENT RAILWAY.—Messrs. Robert Stephenson & Company, Ltd., of Darlington, have lately received an order from the Crown Agents for the Colonies for six locomotive tank engines for the Ceylon Government Railways. The locomotives are to have six wheels coupled with a pair of leading wheels and a trailing bogie. The cylinders will be 19 in. stroke and 26 in. diameter. The same firm have also received a "repeat" order from the Aranco Railway Company for additional rolling stock similar to an order Messrs. Stephenson are now completing for the same company.

SUPPLY OF SLEEPERS.—Messrs. Millars' Karri and Jarrah Co., Ltd., have completed their contract with the Assam-Bengal Railway for the supply of 20,000 Jarrah wood sleepers, which are required for renewals in the Chittagong and Haflong Districts. For renewals [illegible] A.-B. Railway Company have arranged to use 5,000 Ajar wood sleepers and 35,000 Nabor wood sleepers (local).—*Railways.*

BURMO-CHINESE RAILWAY.—Calcutta, 1st August.—The Anglo-Chinese negotiations for carrying on a projected Burmo-Chinese railway is approaching completion. The first section of the line—Bhamo to [illegible] will be a joint Anglo-Chinese undertaking. [illegible] which ends at Yunnanfu, will be a wholly Chinese undertaking. China is also arranging [illegible]

LOCOMOTIVES FOR INDIA.—The North British Locomotive Company have contracted to build 60 locomotive engines for two of the Indian Railways.

CANNING COMPANY, JAPAN.—A fish canning company styled Dai-Nippon Suisan Kabushiki Kaisha is being organized by a number of prominent business men in Tokyo. The Company will open a subscription list for its shares, amounting to 3,000,000 *yen* in face value, on August 1. Applications for subscription have, however, greatly over-reached the amount of shares to be issued. The organizing committee of the Company invited the Press representatives to the Seiyokon, Uyeno, on Saturday, and Lieut.-General Enya, chairman of the committee, delivered a speech, stating that the catch of fish in Japan was more than needed by the country and it could be made more if necessary. But, he said, the country lacked the means of preserving fish and turning the catch to the best profit. The Company aspired to fill the gap, and intended to start its business by curing sardines in olive oil. The Company has its office at Honhaechobori, Kyobashi-ku, Tokyo.—*Japan Times*

CHINESE GOVERNMENT INDUSTRIES.—Referring to the proposal of the Shangpu to establish Government paper mills and printing offices at Peking, Tientsin, and Shanghai, it is reported that this proposal has received the sanction of the Throne. The paper mills will manufacture foreign as well as Chinese paper of different sorts for Government use in the various provinces. The printing offices will be used exclusively for printing books, etc., for the use of the various Government and private schools and colleges in the Empire. Europeans and Japanese are to be engaged as foremen of the establishments.

OIL MILL, HONAN.—Besides the introduction of European machinery into coal mines in this Province, there has been formed in Chouchia Kou a syndicate for crushing sesame oil. A complete crushing plant has been ordered from abroad and is now on the way.

The shares are Tls.100, and about Tls. 300,000 have already been subscribed. Three of the wealthiest families in Chouchia Kou are the financiers.

TEXTILE COMBINE, MANCHURIA.—Fifteen of the largest Moscow textile manufacturers, not competing with each other, have combined to construct a central wholesale textile depot at Harbin, on the same plan as that opened at Omsk, in western Siberia, in 1901, by the same firms. The depot buildings have to be completed by April, 1907. On the initiative of the firms interested a special expert commercial commission will study local wholesale conditions in Harbin and neighborhood, as well as the markets and trade routes gravitating to that city from Mongolia and China generally.

SILK SPINNING FACTORY, SHANGHAI.—Under the joint proprietorship of the Kyoto Silk Spinning Company and a Shanghai merchant named Li Yunchi a silk spinning factory has been established at Shanghai. The proprietors each contributed a capital of 20 million taels. The Kyoto Company has therefore closed its factories at Wakayama and Koriyama, and removed the machinery and plant to Shanghai. The factory will make silk thread from Chinese cocoons.

NEW SUGAR REFINERY, JAPAN.—The office of the Sugar Refining Co., under the auspices of Messrs. Kobei Abe, Masuzo Masuda and several others, with a capital of Y1,500,000, has been opened at Minami Naka-dori Sanchome. The factory of the new firm near Kawasaki is under construction.

CEMENT FACTORY, CANTON.—Some time ago the Viceroy ordered machinery from a German firm on Shameen for the manufacture of cement. The site for this factory has been selected in a place at the extremity of Honam. The erection of the factory was commenced recently with Taotais Wen and Kung as directors.

ICE FACTORY, CANTON.—The building for the new ice-works will commence at once and the machinery is likely to be set up and in working order by early next spring.

OSAKA SUGAR REFINING CO.—The directors of this Company have decided to resign in a body in consequence of the disagreement with shareholders regarding the heavy loss sustained on the last half-year's working. The directors have given notice of resignation and also propose to withdraw the resolution to establish a refinery in Formosa. The shareholders, however, demand a special meeting to decide upon the course to be taken.

CELLULOID COMPANY, JAPAN.—The *Tokyo Asahi* states that a celluloid company with a capital of 5,000,000 *yen* will be organized in the vicinity of Osaka, under joint ownership of Japanese, British, French, and German businessmen. Baron Shibusawa and Dr. Soyeda are among the promoters.

FERTILIZER COMPANY, JAPAN.—A company called the Teikoku Hiryo Kabushiki Kaisha (Imperial Fertilizer Company) is being organized by Messrs. Makoshi, Satake, Hiranuma, Fukuzawa, and other Japanese and foreign business men. The company will have a capital of 3 million *yen*, and engage in the manufacture of phosphatic fertilizer.

OSAKA GLASS WORKS.—The construction of the Osaka Glass Works having been completed, the manufacture of glass will commence at the end of August. The company intends to manufacture plate-glass valued at *yen* 1,200,000 per year. This factory is the first establishment of its kind in Japan.

COTTON MILL, OSAKA.—A plan is mooted to establish a great factory for weaving cotton shirtings in Osaka. It is proposed that it should have 30,000 spindles and 500 looms. Mr. Sanji Muto of the Kanegafuchi Cotton Mill, is carrying out investigations in this connection.

NEW MINT, YUNNAN.—The Viceroy of Yunnan has been granted conditional permission to start a mint for coining copper and silver money for the use of the Yunnan-Szechuen railway.

COTTON MILL, KOREA.—The Korean Government is going to establish a cotton ginning mill at Mokpho at a cost of 27,000 *yen*. The plant will be supplied by Osaka, and the construction completed by November next.

DISINFECTING PLANT, AMOY.—The American Consul at Amoy, China, has requested the government to give him a disinfecting station similar to the one at Hongkong.

THE JAPAN SUGAR REFINING COMPANY.—This Company is said to have agreed to amalgamate with the Osaka Sugar Refining Company.

BABCOCK & WILCOX BOILERS.—Messrs. Babcock & Wilcox have received the following orders recently for their Patent Water Tube Boilers through their Indian Agency:—

The Ahmedabad Fine S. & W. Co., Ahmedabad, one boiler.

The Ahmedabad Ginning & Mfg. Co., Ahmedabad, one boiler.

Mr. C. Oleese, Parbhani, one boiler.

The Saraspur Mfg. Co., Ahmedabad, one boiler.

The Bombay Tramway and Electric Supply Company, four boilers of 1,000 H. P. each. This makes the third order for this Company, making a total of eight boilers of the same size.

The Bombay Port Trust, Bombay, one boiler.

The Hindustan Pressing & Mfg. Co., Ltd., one boiler, this being a repeat order.

The Hindustan S. & W. Mill, Bombay, solid drawn steel steam and feed piping. This is an innovation of steam and feed pipe work in India, all the branches including as small as 2" being riveted on and entirely of steel; the valves in this installation being also cast steel. This, we think, is the first instance in India wherein a steam and feed range for a large mill no cast-iron is used.

The Baroda State, Baroda, solid drawn steel steam and exhaust piping for the Electric Light Station, Baroda, through Messrs. Macbeth Bros. & Co., Bombay.

Three boilers were supplied a short while ago to the Bomanjee Petit Mill, Mahaluxmi, Bombay, and were started this week. These boilers have been supplied with Babcock and Wilcox Patent Chain Grate Smokeless Stokers and have proved a great success, two boilers driving the whole mill, and that at any time no smoke is to be seen from the chimney, which is a very great contrast to the chimneys of the surrounding mills. These were also supplied with steam and feed piping.

COMMISSION AGENCY, MANCHURIA.—The *Nichi Nichi* reports that a plan is on foot in Tokyo for the establishment of a commission agency in Manchuria with a joint capital contributed by Japanese and Chinese. According to the scheme of the promoters, both Governments also are to have an interest in the concern, just as they have in the South Manchurian Railway Company; and the agency is to be named the "Manshu taku Hanbai Kabushiki Kaisha." The principal line of the company's business, it seems, will be to act as selling agents for Manchurian merchants, but they themselves will also engage in manufacturing, working mines, felling timber, and the transportation of goods by sea. It is said that the Financial Minister and Mr. Ishizuka, Chief of the Kwantung Civil Administration Office, have already given their approval to the scheme; and the plan is apparently approaching maturity.

(*Japan Mines*)

SUBMARINE TIN DREDGING, SIAM.—One of the latest and most enterprising tin ventures is, says the Bangkok *Times*, that of Captain Miles who has formed the idea of dredging the ore from the bottom of Puket Harbor, in Siamese Malaya, from a depth of some eighteen feet or so. Experimental dredgings and borings have proved that there is a good deal of tin at the bottom of the bay, and Captain Miles has been in Bangkok for some little time in treaty with the Siamese Government, for a concession of the right to dredge the bay for the tin. In return for the grant Captain Miles is prepared to dredge a deep water dock at Puket, and a channel leading to it of sufficient depth to accommodate ships of twenty feet draft and under. Little doubt is entertained that the concession will be granted.

TIES FROM JAPAN.—Pres. Harriman of the Southern Pacific Ry. has contracted for a large order of railroad ties from Japan. These ties are being delivered at Guaymas, Mexico, for 56 cents [gold] each, and will be used in building the new road in the states of Sinaloa and Sonora to connect with the main line of the Southern Pacific at Benson.

MANCHURIAN EXHIBITION, MUKDEN.—The much-talked-of Manchurian Exhibition will be opened at Mukden on the 1st October. The Government will probably build the premises for the Exhibition, and its promoters, who are the Chambers of Commerce at Tokyo, Osaka, Kyoto, Nagoya, Yokohama, and Kobe, will make efforts to persuade our merchants and manufacturers to send exhibits there.

JOSHUA HENDY MACHINE WORKS, SAN FRANCISCO.—The plant of the Joshua Hendy Machine Works, at Bay and Kearney streets, San Francisco, Cal., was entirely destroyed by the fire following the recent earthquake. They will put up extensive works with all modern improvements in pattern shop, foundry and machine shop, and will be in the market for tools and machinery of all kinds.

JAPANESE OIL CONTRACT.—Cabling recently the *Mainichi's* special representative at Washington states that the Petroleum Refining Company of California has made public the signing of a contract with the Japanese Government for the supply to the latter of 2,000,000 barrels of petroleum annually for ten years. It is understood that the oil is to be used as fuel for Japanese warships.

YALU NEW TIMBER COMPANY.—The Japanese are now seeking to promote a Chino-Japanese Timber Company for the timber on the Yalu, each country furnishing half the capital of 2,500,000 yen. The head office will be at Tokyo with a branch office at Antung and it is said to be one of the first matters the new Minister will take up after he has presented his credentials.

PATENT MEDICINE COMPANY, SHANGHAI.—A company has been formed in Shanghai for the purpose of extending the sale of the late Mr. Peter Sys' well known remedy for dysentery and kindred diseases. Mr. Thomas Freeman, a representative of the company, is proceeding on the "Thomas" to the United States, where he hopes to get the Government to adopt the remedy for use in the Army.

PUBLIC WORKS LOAN, INDO-CHINA.—M. Beau, the Governor-General of Indo-China, is on his way to France to consult the Home Government about raising a public works loan for the Colony. The naval and military defences of the Colony will also, it is said, be discussed. M. Beau will return to Saigon in a few months.

MITSUI BUSSAN KAISHA.—There have been changes in the posts of managers of the branch offices of the Mitsui Bussan Kaisha, as follows:—

Mr. Seijiro Tanaka, Moji, to be Manager of the Hongkong branch.

Mr. Shingo Minami, Hongkong, to be attached to the head office.

Mr. Masanao Kobayashi to be Manager of the Nagasaki Branch.

Mr. Ippei Nakamaru, Singapore, to be assistant of the Moji Branch.

Mr. Tokutaro Hayashi, Assistant at Shanghai, to be Manager of the Singapore Branch.

THE CULTIVATION OF MAGUEY IN THE PHILIPPINE ISLANDS

(Continued from page 132.)

The following New York quotations for sisal hemp and for "Fair Current" Manila indicate the relative value of Manila hemp and good machine-cleaned maguey:

	1902.	1903.	1904.	1905.
Aug. 2:	*Cents.*	*Cents.*	*Cents.*	*Cents.*
Sisal hemp	9 to 10	7	7¼	.....
"Fair Current" Manila	10½	8	9¼	.....
Nov. 1:				
Sisal hemp	8¾	7½	8	.....
"Fair Current" Manila	10¼	8⅞	9¾	.....
Feb. 1:				
Sisal hemp	.....	7 to 7¼	7¾	7¾
"Fair Current" Manila	.....	8¼	9½	10
May 1:				
Sisal hemp	.....	9 to 9¼	8½	7⅝
"Fair Current" Manila	.....	9½	.....	9⅞ to 9¾

The following table shows the output and value of Yucatan sisal from 1900 to 1905:

Year.	Bales.	Value, Mexican currency.
1901	517,519	22,783,453.73
1902	528,246	36,432,790.11
1903	590,430	33,481,603.51
1904	[illegible]	[illegible]
1905 to Sept. 1	579,676	18,036,045.19

USES.

The most important use of sisal hemp and maguey in the United States is for the manufacture of binder twine. This fiber is also largely used for tarred lath and fodder yarns, and for other cordage purposes.

In Yucatan and South America sisal is employed for cordage, nets, lines, hammocks, saddlecloths, girdles, bridles, etc. The Yucatan sisal hammocks, made from carefully prepared, hand-cleaned sisal, are remarkably strong and durable.

In the Philippine Islands, particularly in the Visayas, considerable maguey fiber is produced for local use. The young and tender leaves are selected and are cleaned by the scraping process used for cleaning pineapple leaves. The fiber thus obtained is soft and fine, and is used for making delicate handkerchiefs and cloth. Maguey is also used to some extent, in the localities where it is cultivated, for making various kinds of cordage.

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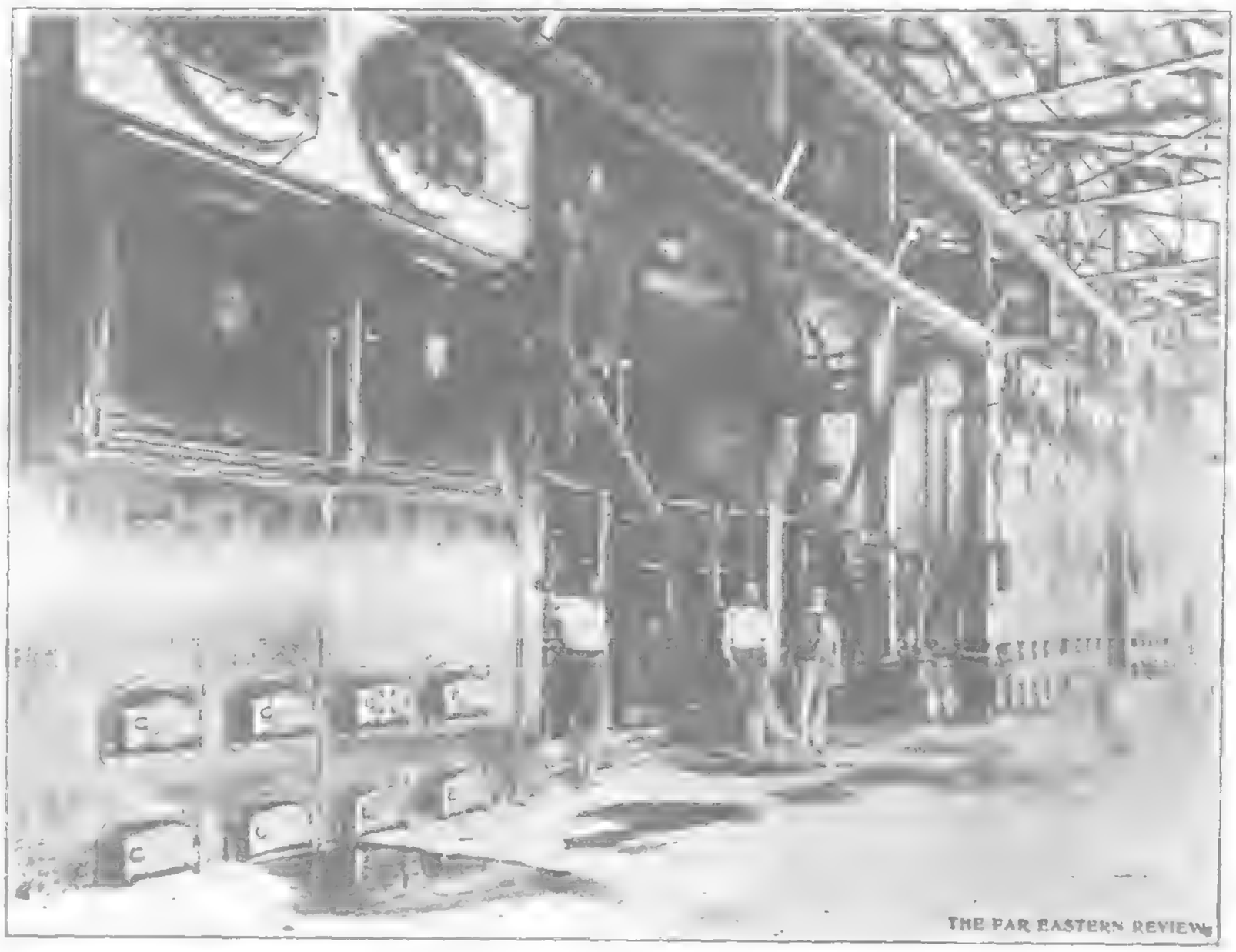
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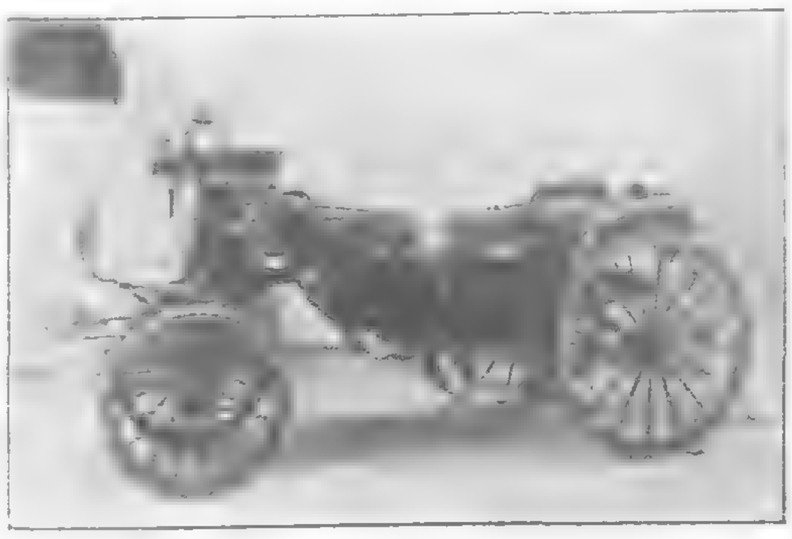
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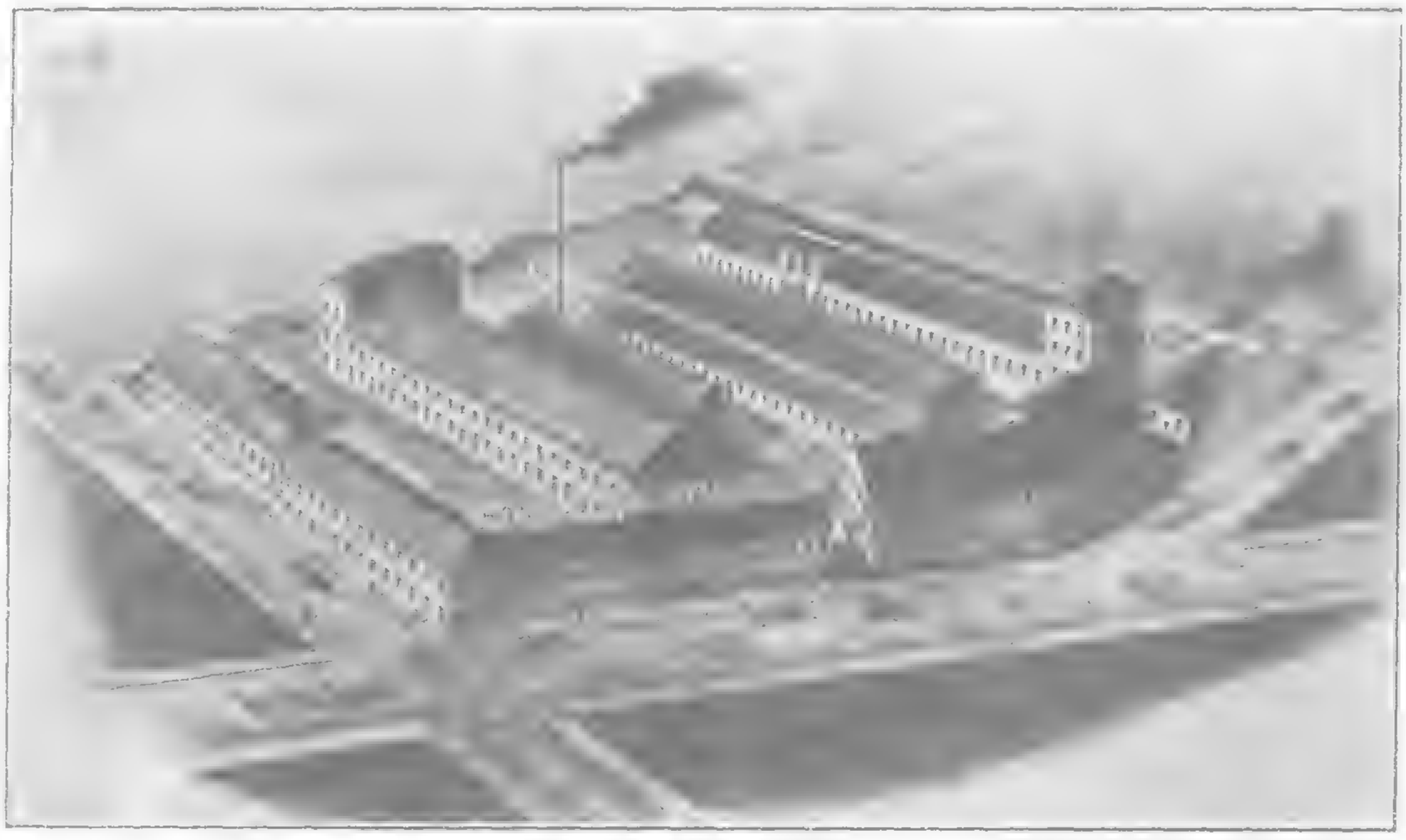
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LENGTH ON BLOCKS	714 "	LENGTH ON BLOCKS	513 "	LENGTH ON BLOCKS	[illegible] "
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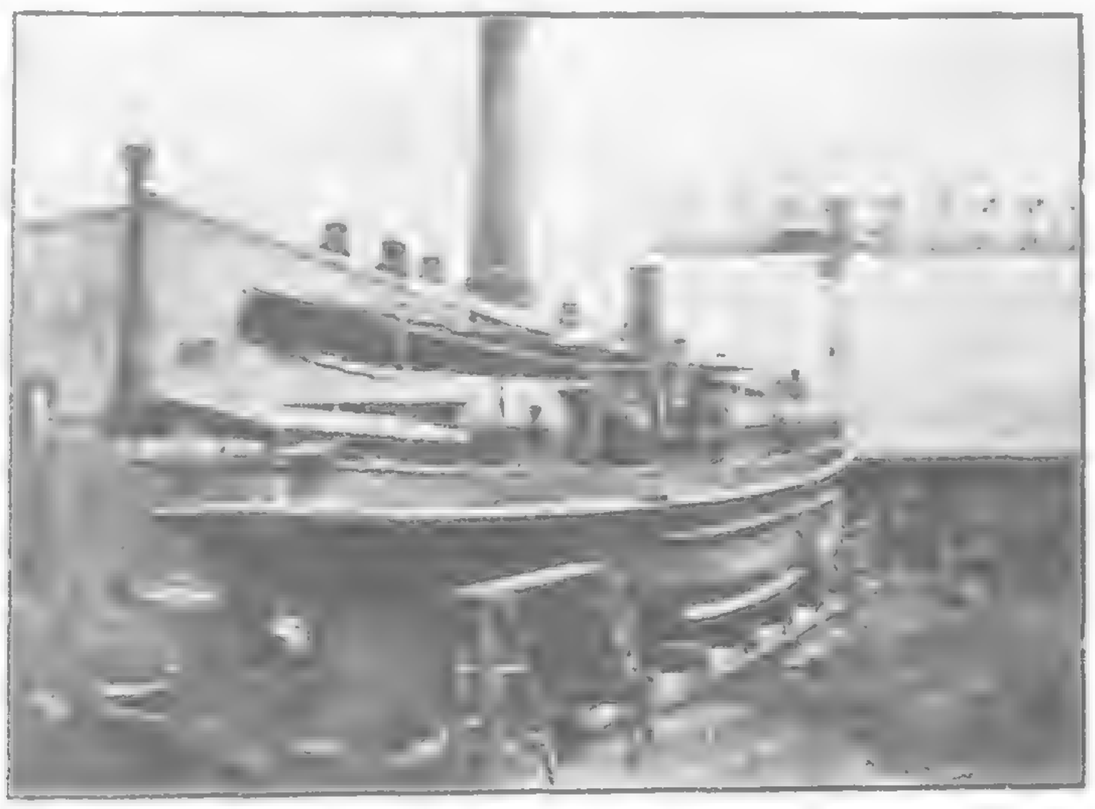
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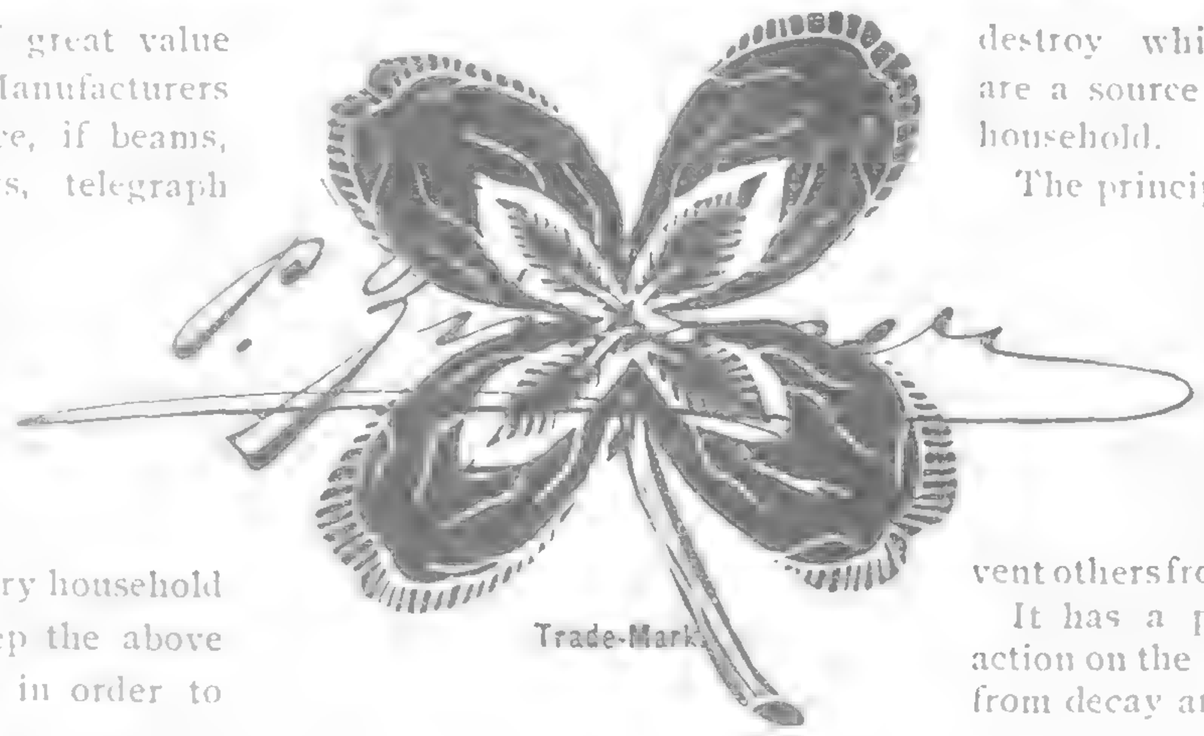
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PATENTED IN INDIA, STRAITS SETTLEMENTS AND OTHER COUNTRIES

The COMPOSITION is of great value to the Building Trade, Manufacturers and Railways; for instance, if beams, wooden structures, sleepers, telegraph poles, etc., are coated with the above COMPOSITION, they will remain in a sound condition and in a good state of preservation, as they will not be attacked by wood destroying insects.

It is also advisable for every household in tropical climates to keep the above COMPOSITION for daily use, in order to destroy white ants and dry rot which are a source of great trouble to every household.



The principal actions of the COMPOSITION on wood are as follows:

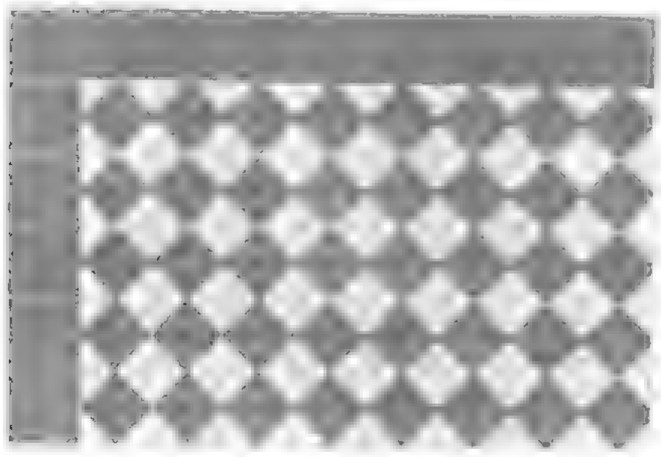
The oily substances are easily soaked into the wood and will not only destroy the white ants and other wood destroying insects that are actually there, but will prevent others from attacking wood so coated.

It has a preserving and disinfecting action on the wood and protects the same from decay and dry rot.

APPLICATION:—The application is extremely simple and may be performed by any unskilled laborer. Take COMPOSITION and coat wood with a brush. It is advisable to coat wood a second time.

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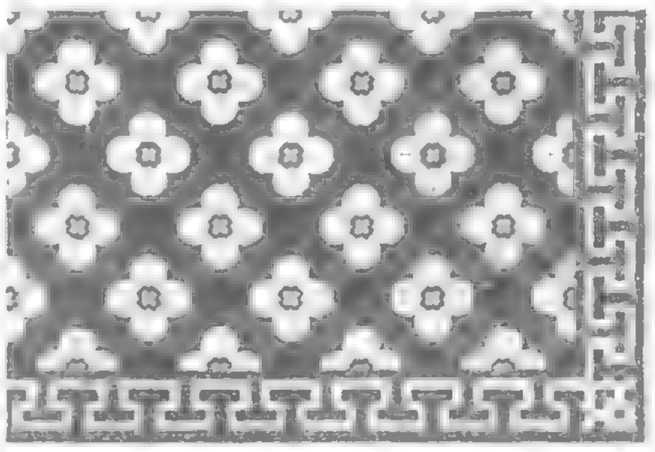


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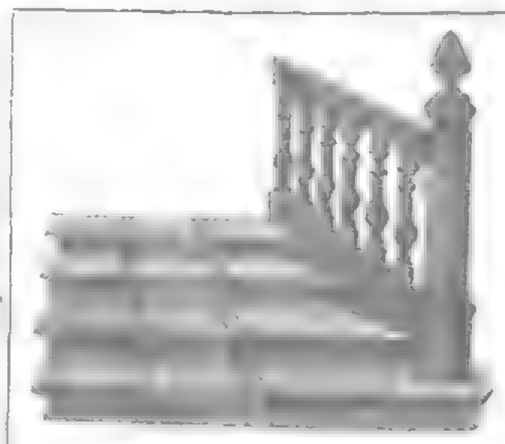
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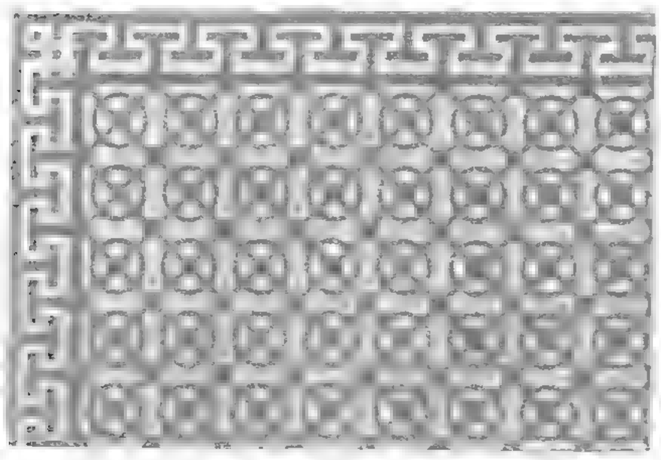
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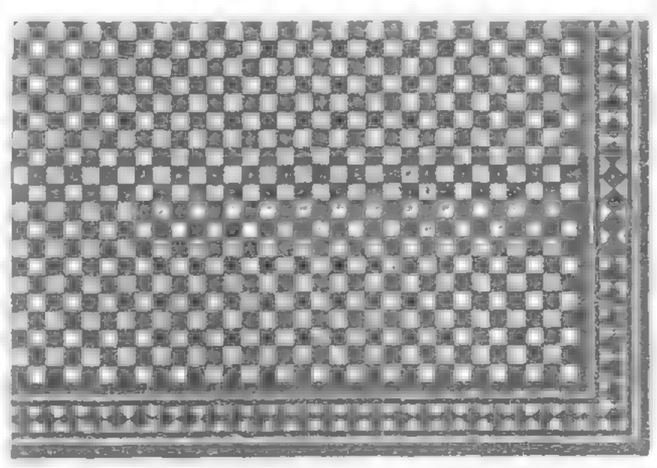
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S. Pearson and Son, Ltd., Railway Works and many others.



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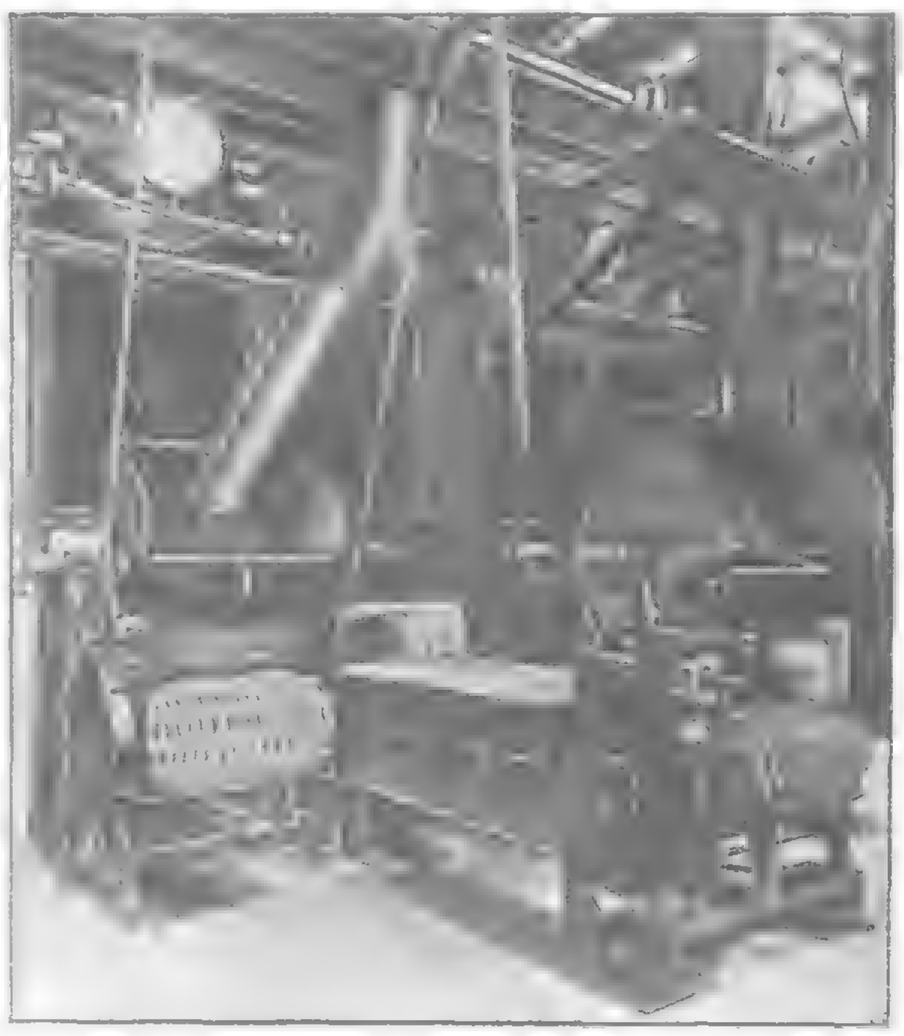
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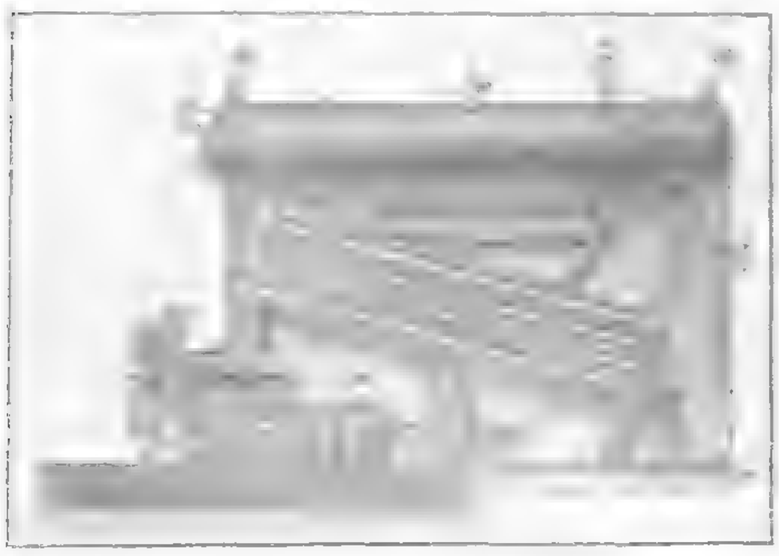
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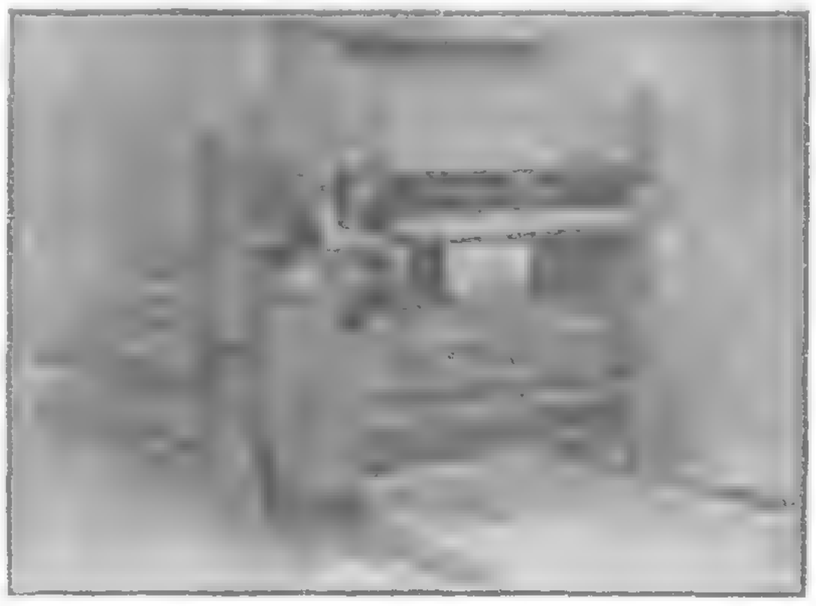
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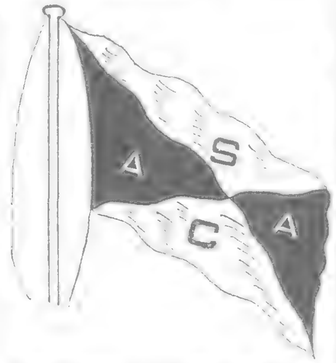
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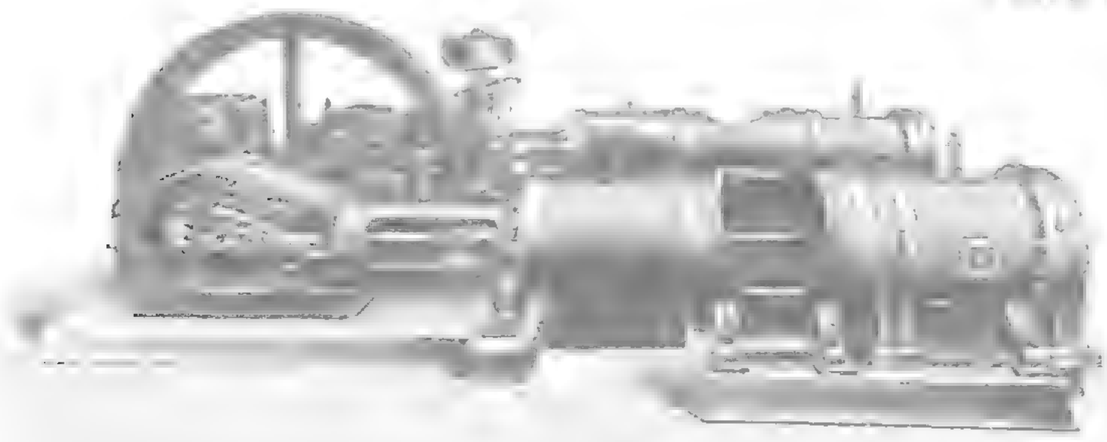
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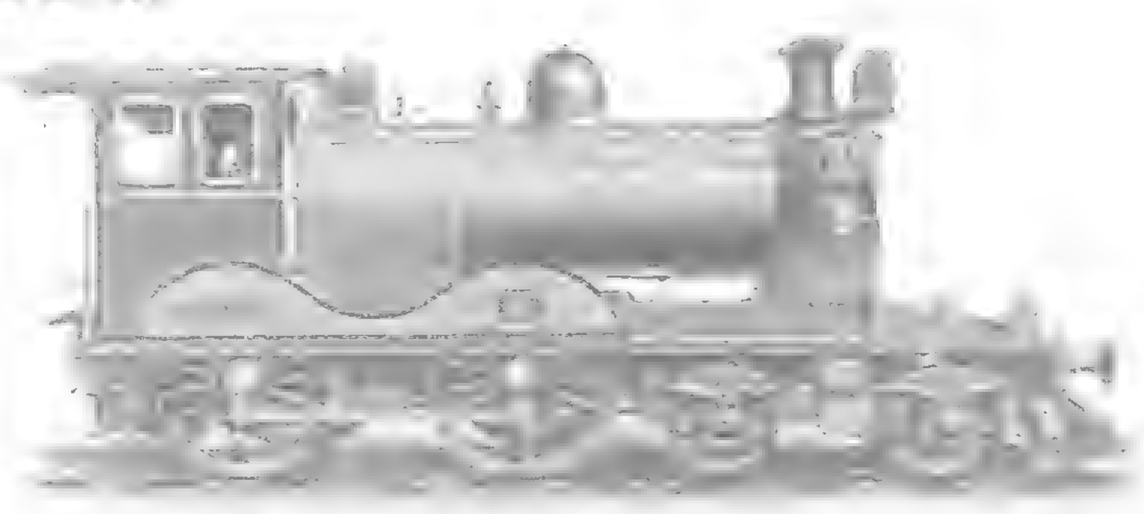
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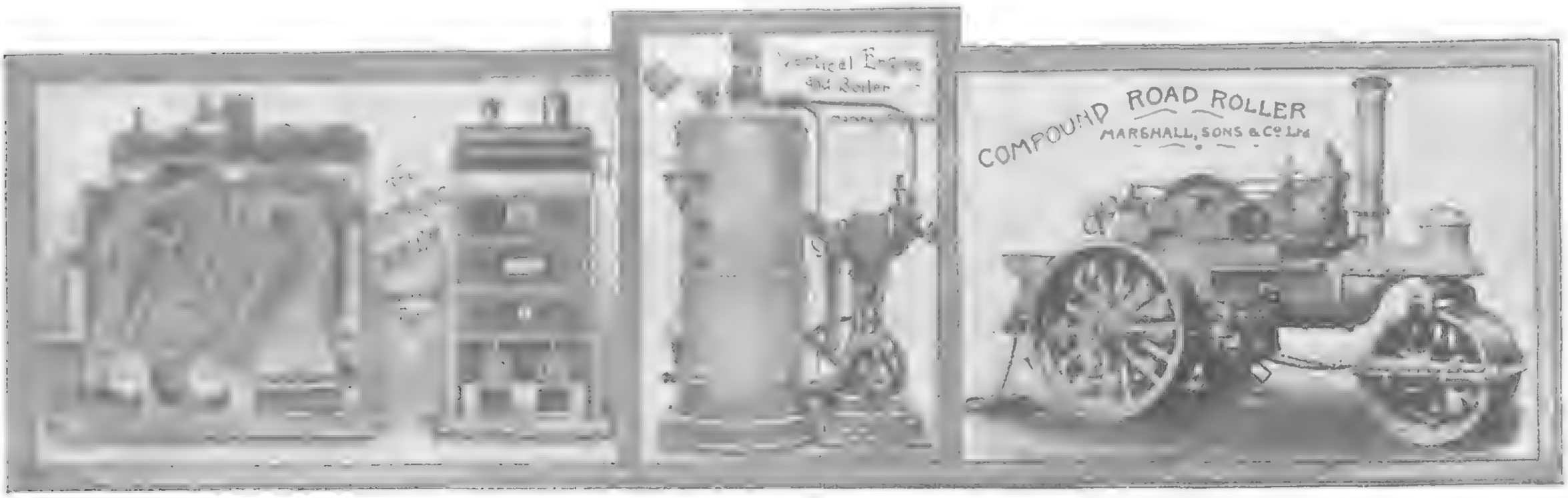
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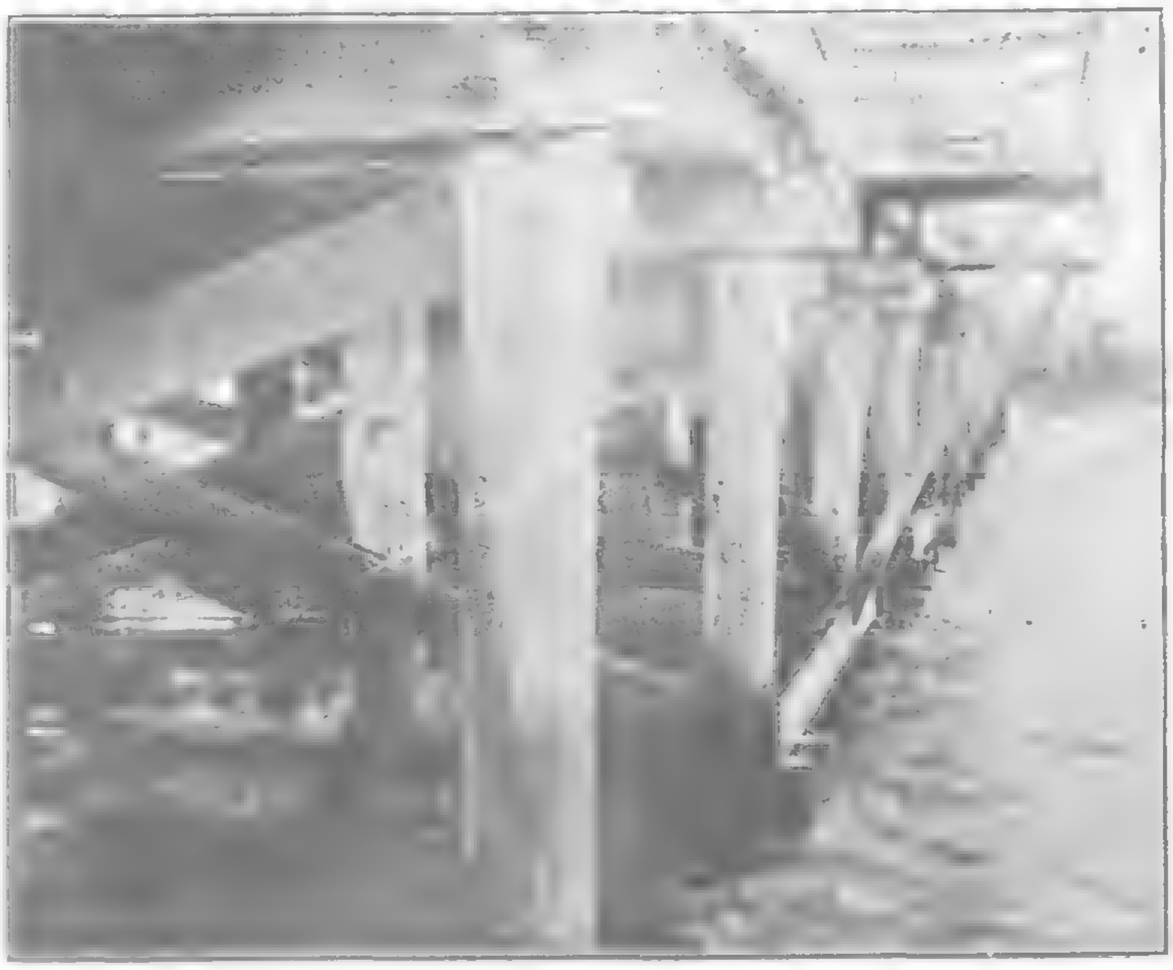
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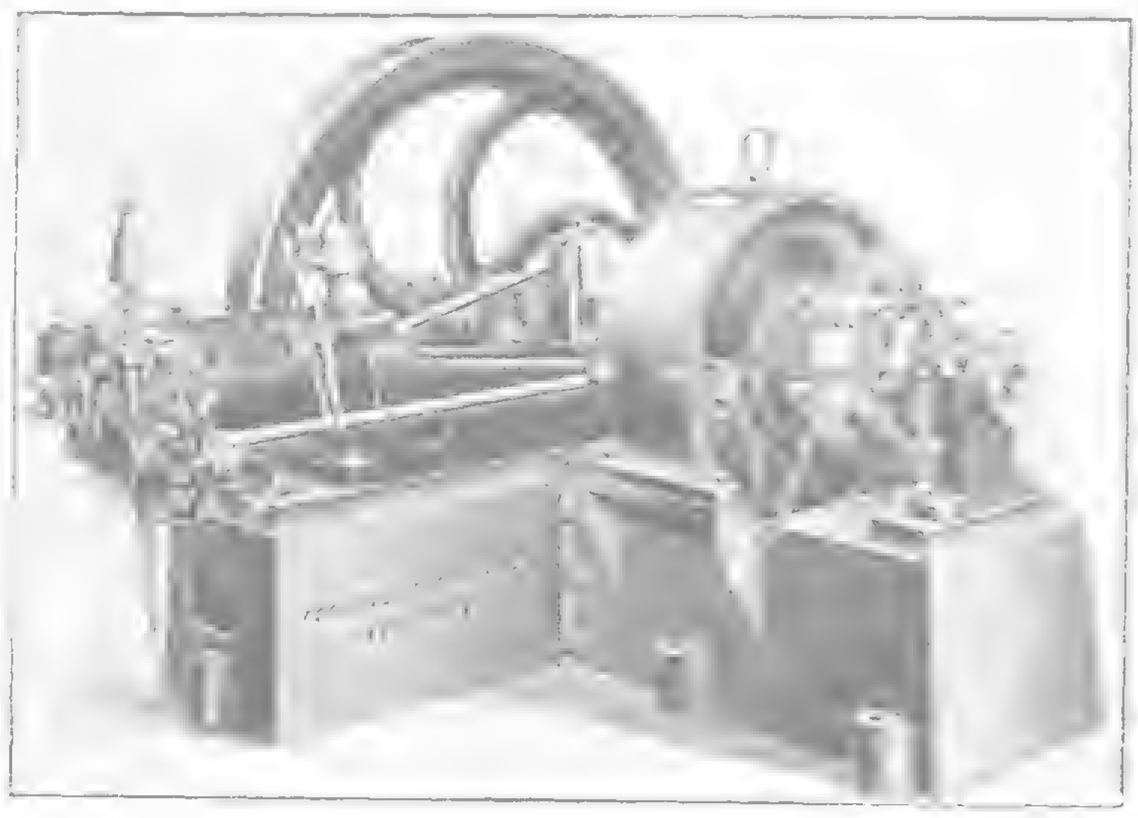
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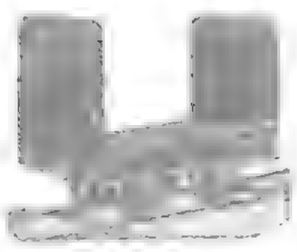
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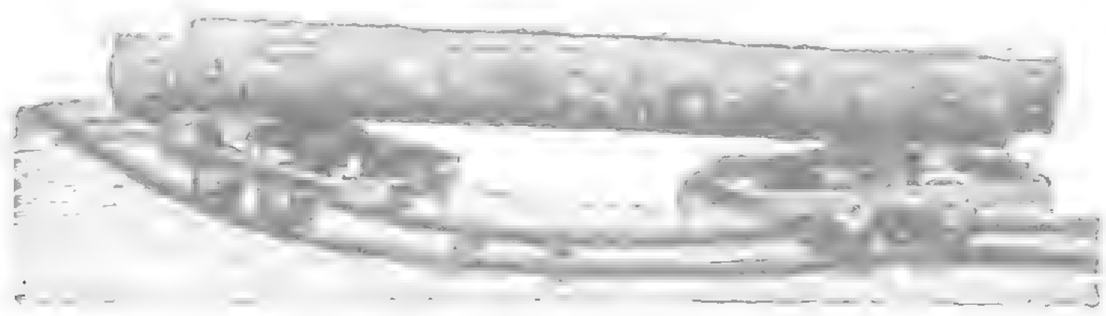
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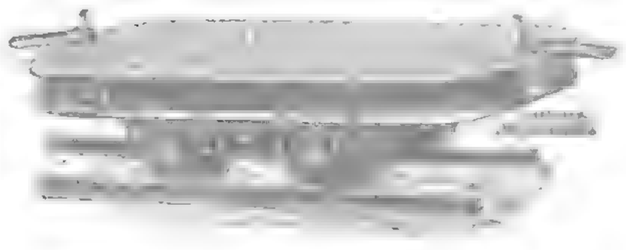
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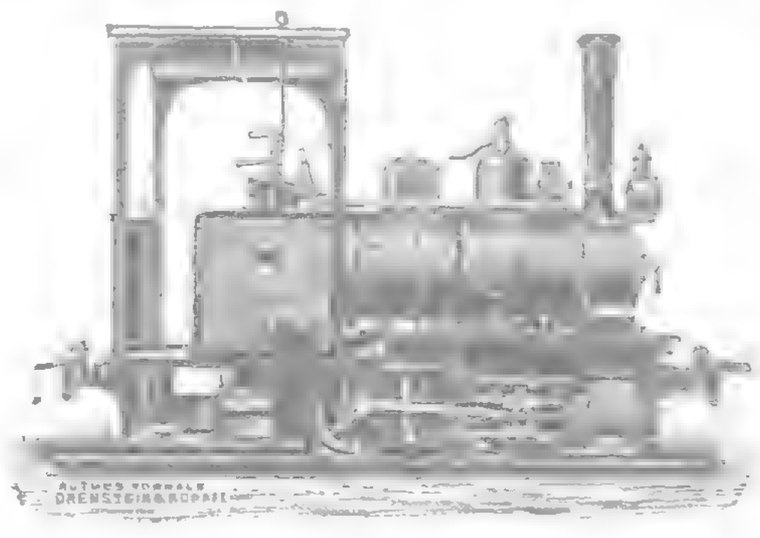
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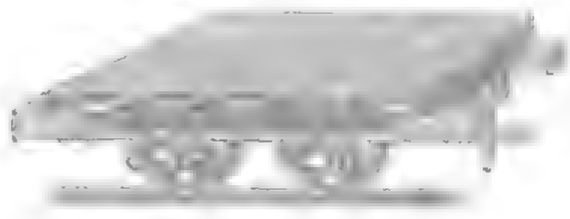
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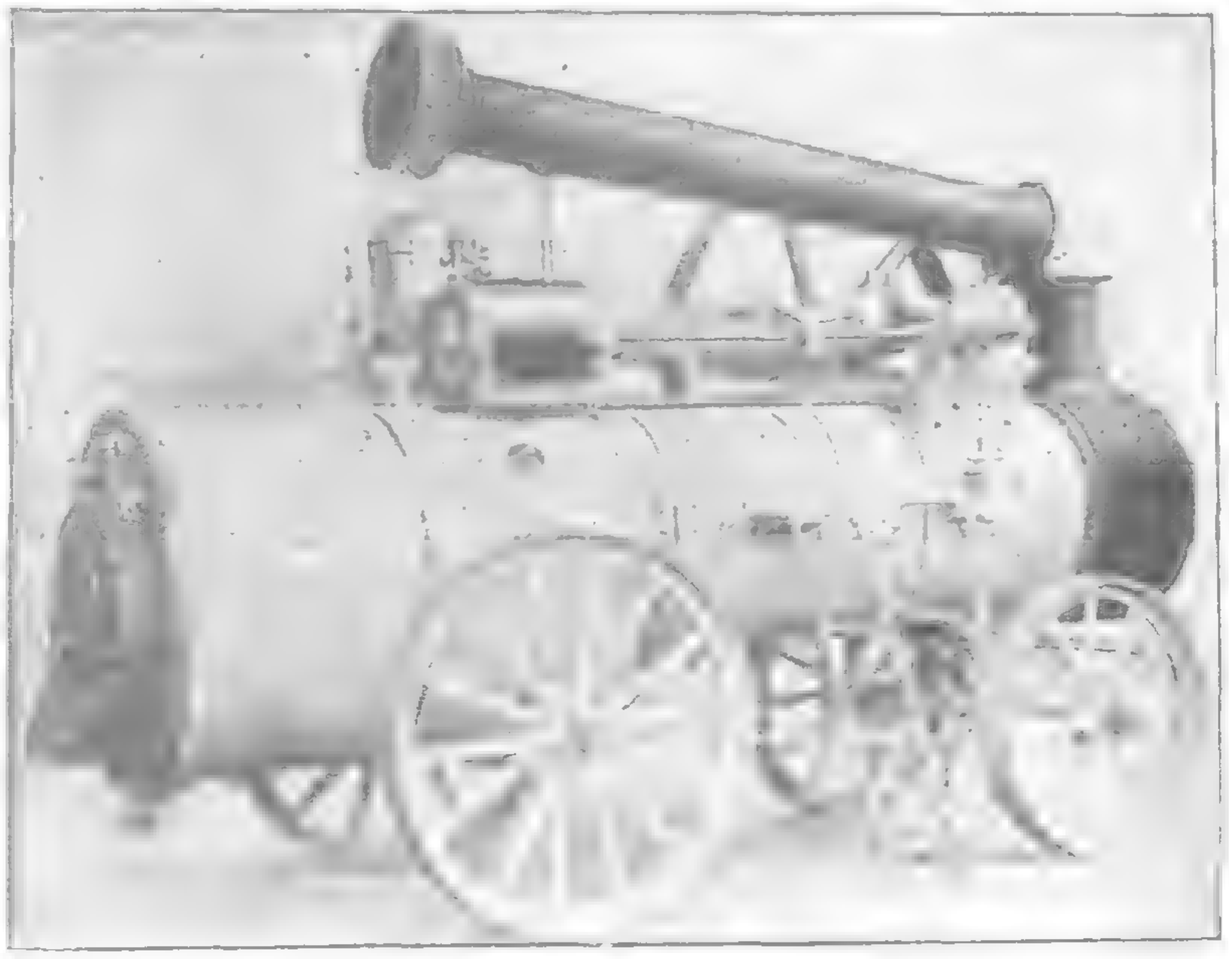
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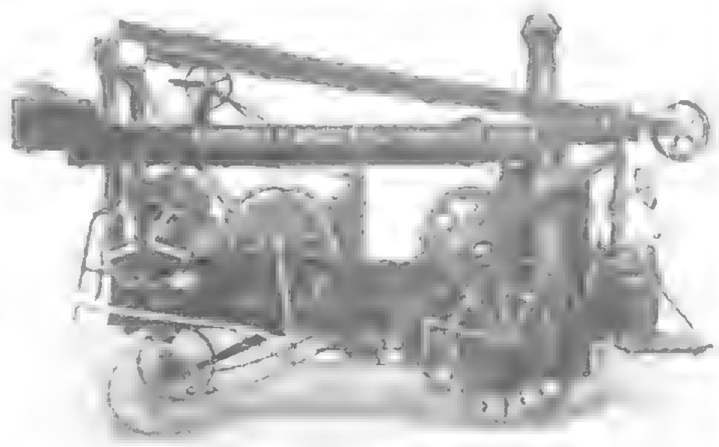
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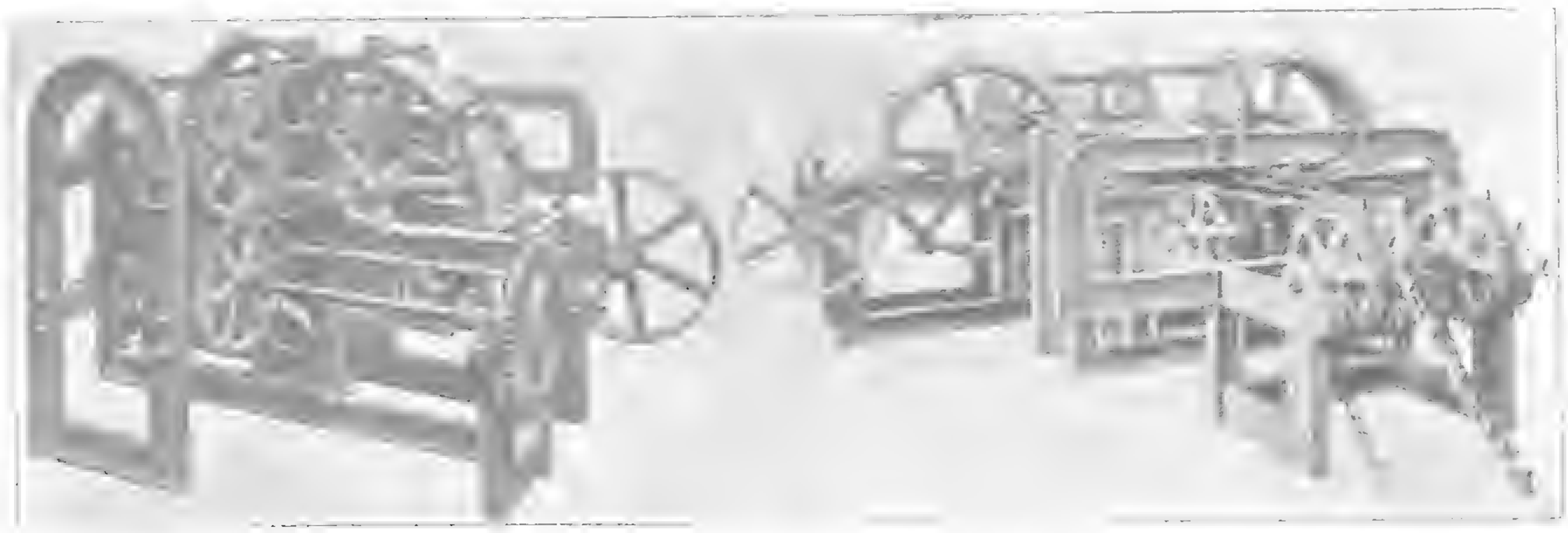


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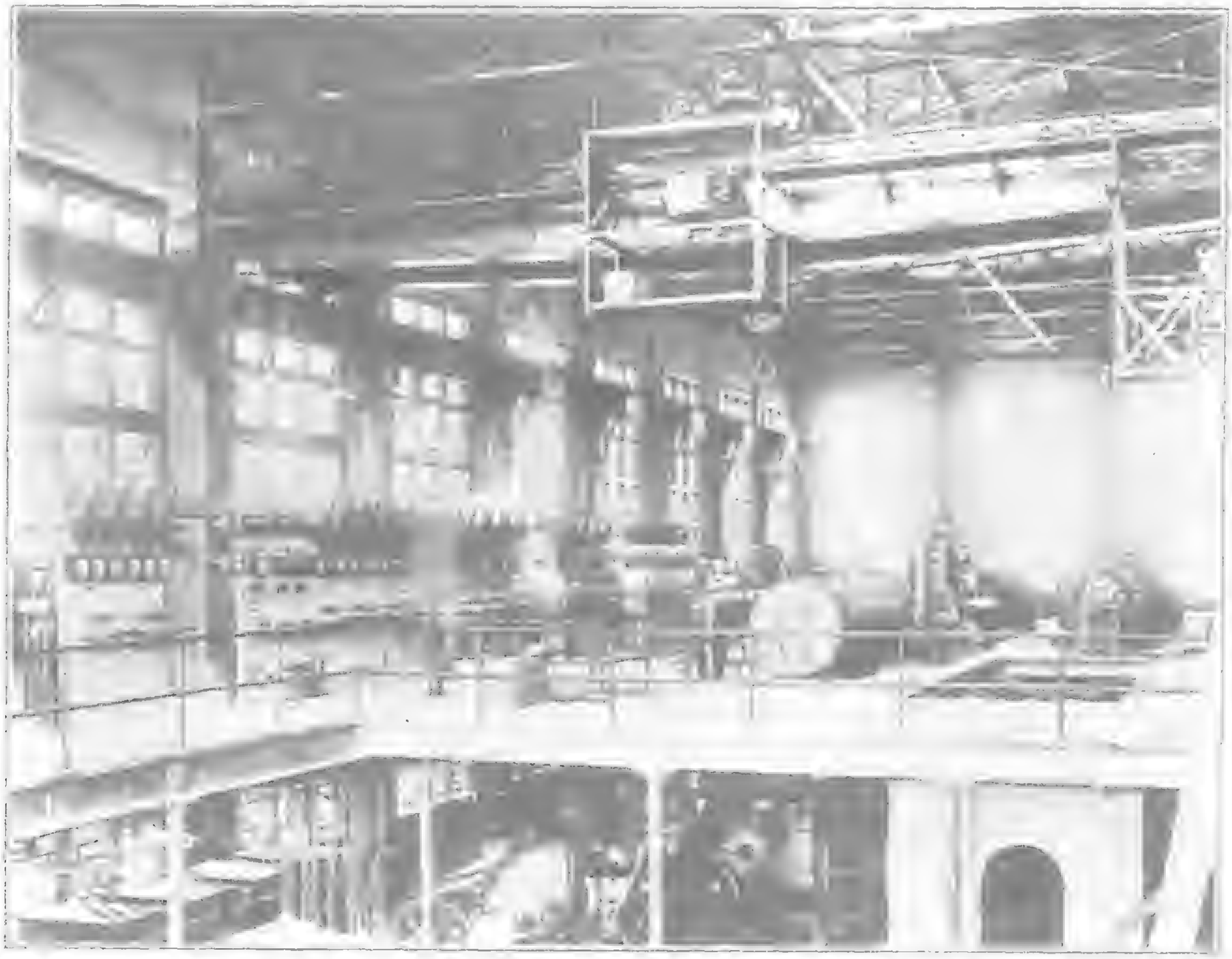
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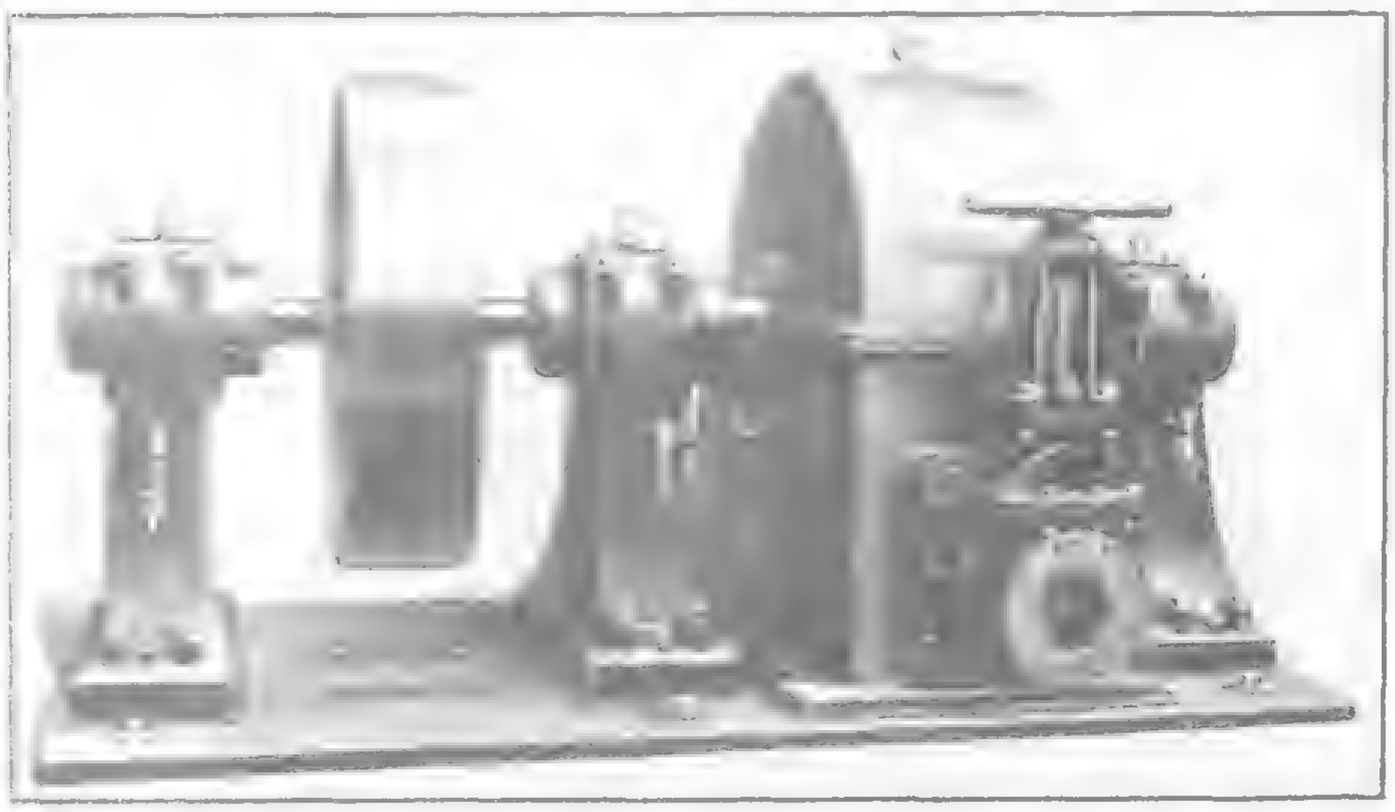
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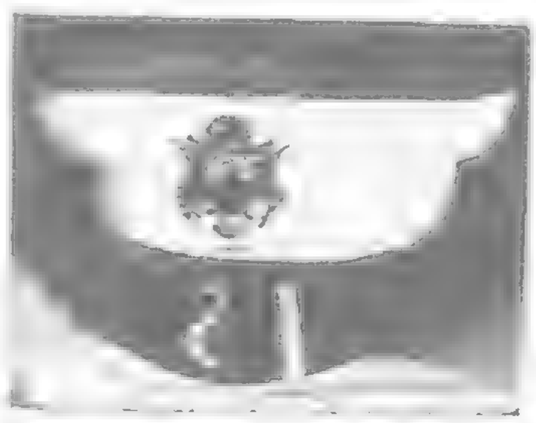
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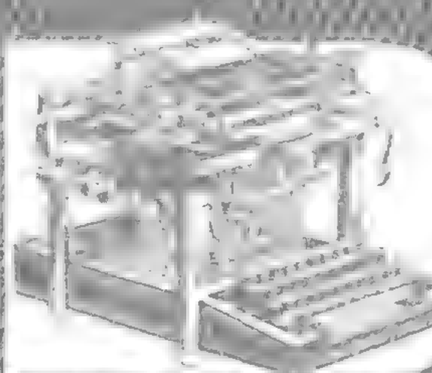


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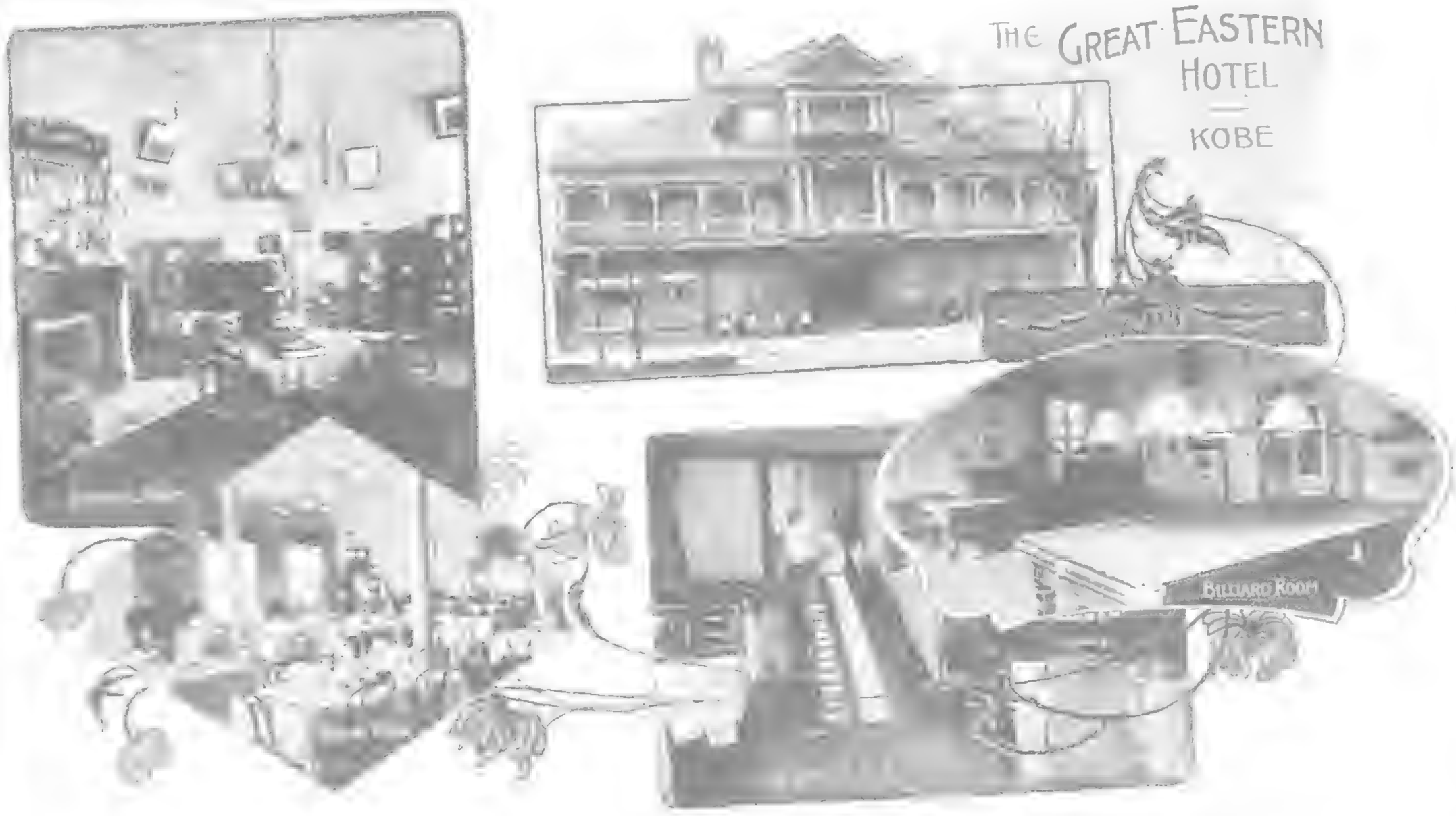
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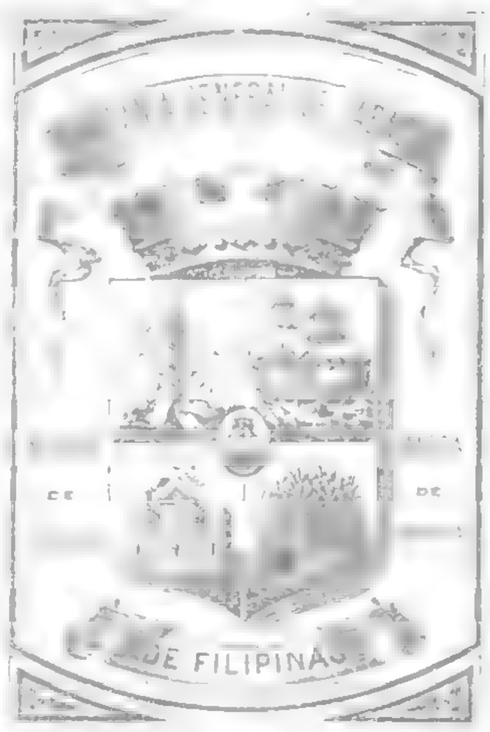
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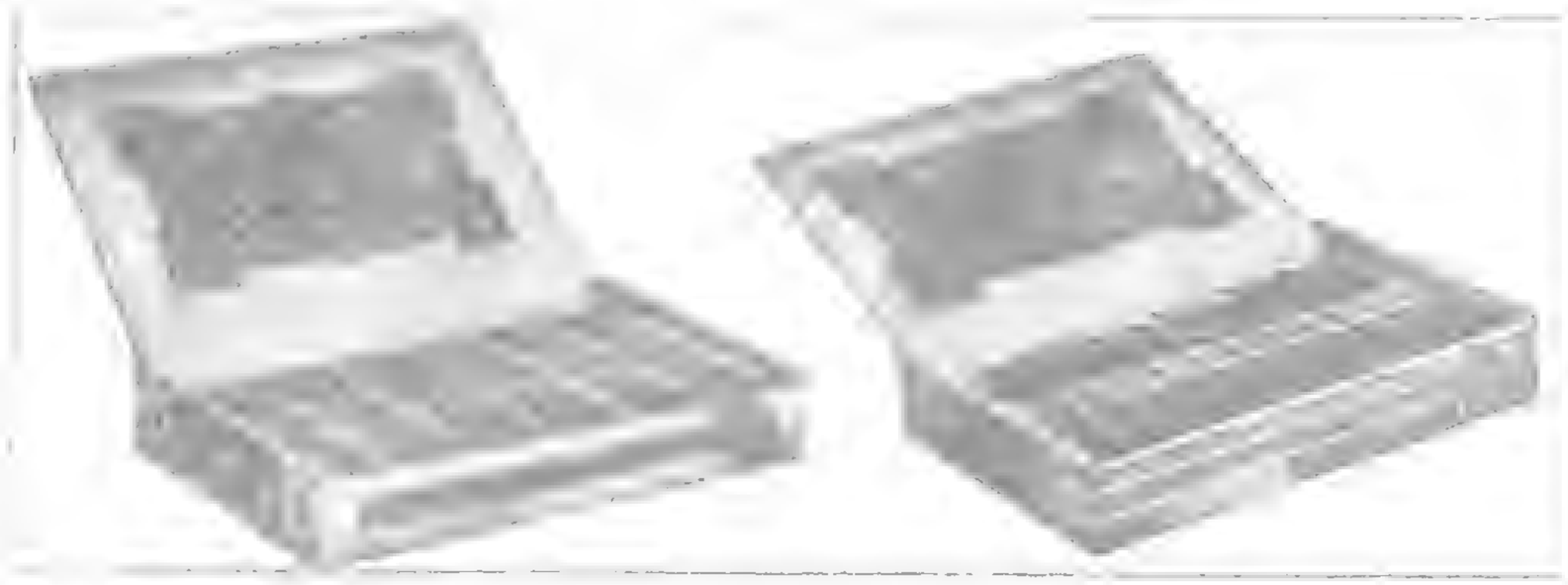
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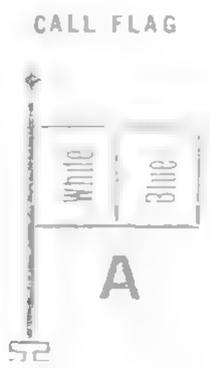
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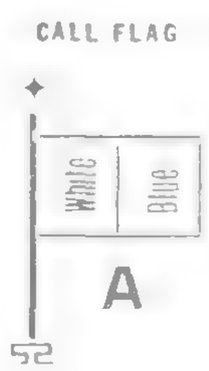
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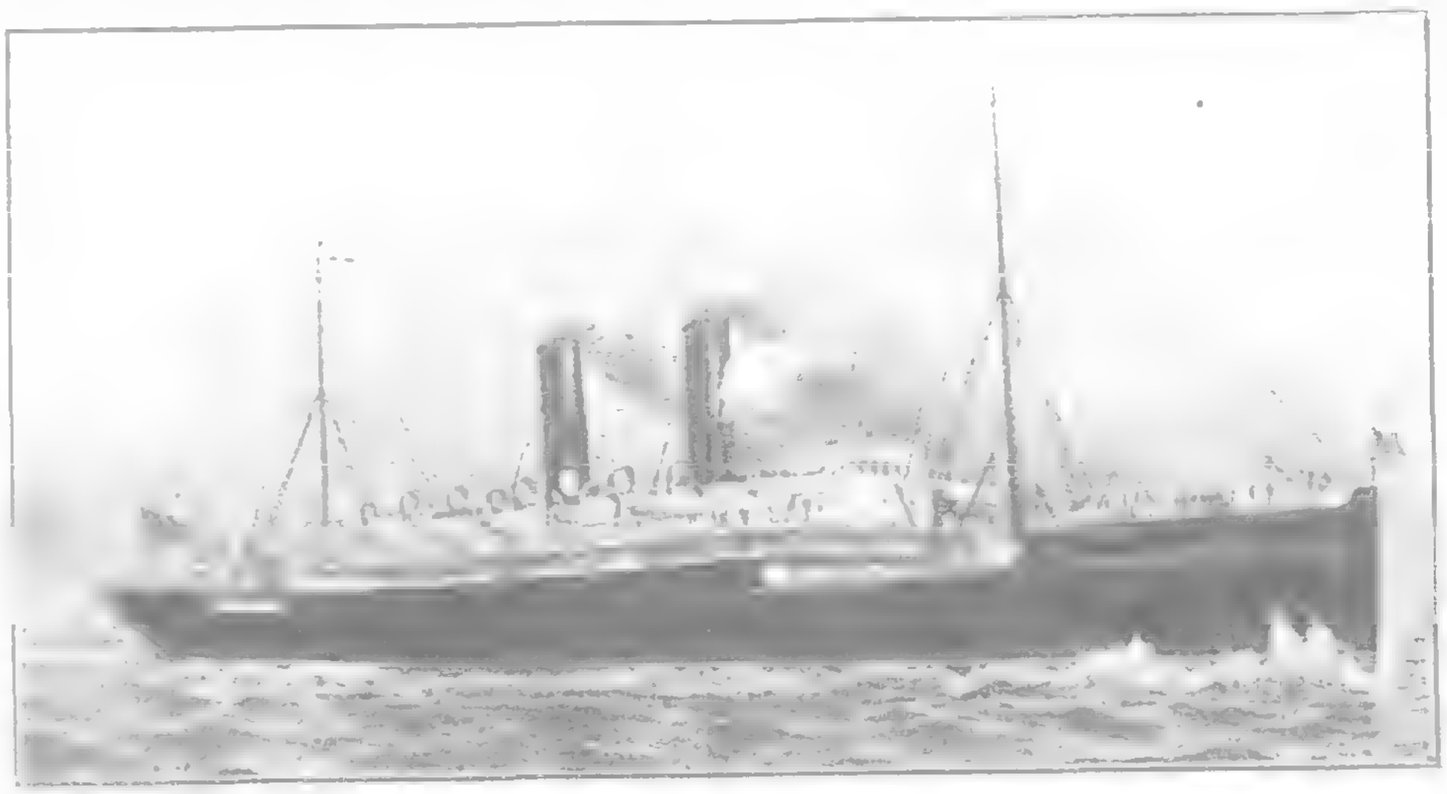
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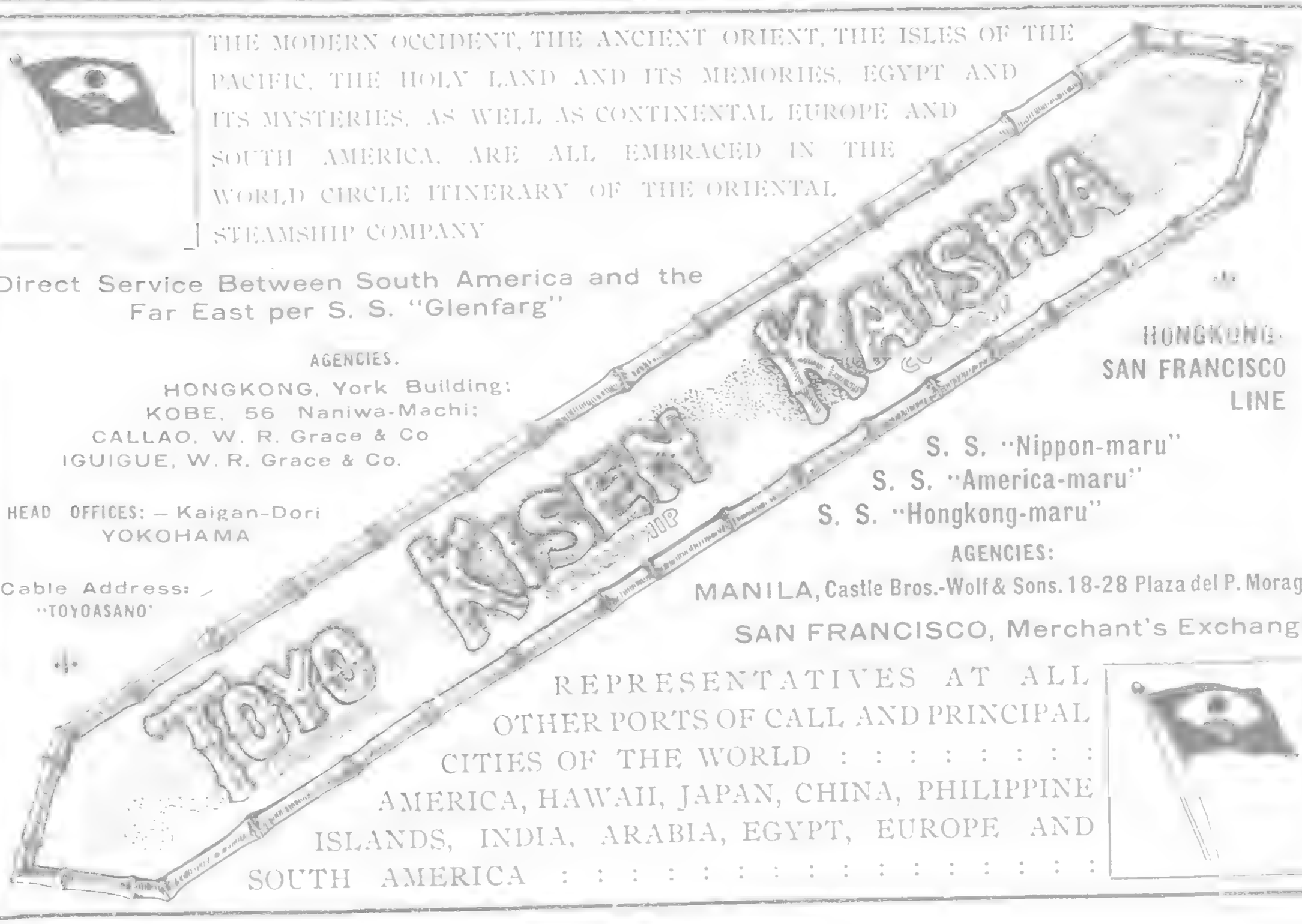
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The DOCKS are fitted with every appliance in the way of Caissons, powerful Centrifugal Steam Pumps, etc., which enable them to be pumped out in three hours.

WORKSHOPS.—The extensive workshops on the premises at Kowloon, Cosmopolitan, and Aberdeen Docks possess every facility and appliance necessary for the repairs of ships and steam machinery. The Engineers' Shops are supplied with a large plant of the latest types of tools in the way of Lathes, Planing, Milling and Screwing Machines, Electric Cranes, etc., etc., and capable of executing the largest class of work with despatch. The Shipwrights' Department has attached to it a Steam-Sawmill with Circular, Vertical and Band Saws, and also a complete plant of Wood-working Machinery of the most modern and improved type. The Blacksmiths' Shops are equally well furnished with a complete supply of powerful Steam Hammers, Cranes, etc., capable of forging stern posts and crank and straight shafting of the largest size.

Powerful Lifting Shears with steam purchase at two of their Establishments stand on a solid granite seawall, alongside which vessels can lie drawing 21 feet of water, and take in or out boilers, etc. The Shears at Kowloon are capable of lifting 70 tons.

The Company is prepared to tender for the construction of new vessels in either steel, iron or wood, having already built about 600 of varying sizes up to 3,000 tons; also to execute all kinds of ship work at lower rates and with greater despatch than any establishment in the East. Every department is under the close supervision of experienced European foremen.

SHIP YARD is fully equipped with modern plant, including hydraulic flanging and bending machines, electrically driven rolls, punching, shearing, angle-bevelling, jogging and planing machines, capable of dealing with the heaviest class of work.

BOILER-MAKERS' DEPARTMENT.—The Company, in addition to executing repairs, is prepared to tender for new boilers to steamships for the construction of which it possesses special facilities, including powerful punching and shearing machines, hydraulic rivetters, etc.

FOUNDRY.—The foundry is fitted with a large powerful Steam Crane and the Cupolas are capable of casting up to 100 tons. The Company is prepared to supply the very best Iron and Brass Castings of all descriptions upon the shortest notice.

GALVANIZING PLANT of the most modern type by electrical deposit has been put up at the Kowloon Establishment, which is capable of doing the largest class of work.

STORES.—The Company's Godowns contain large and well-selected stocks of all material and fittings requisite in shipbuilding, engine room outfits, furnishings, and ships' stores of all descriptions supplied at tariff rates.

For Further Particulars apply at the Offices of the Company, Queen's Buildings, No. 1, New Praya, Hongkong

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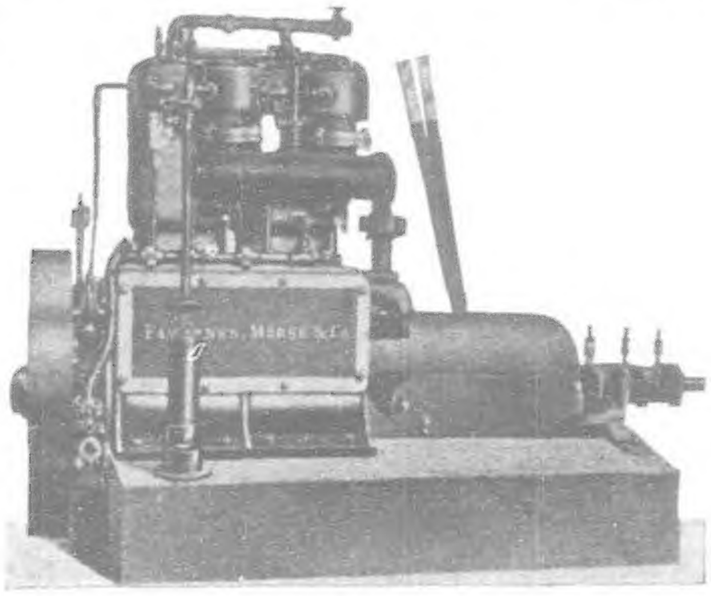
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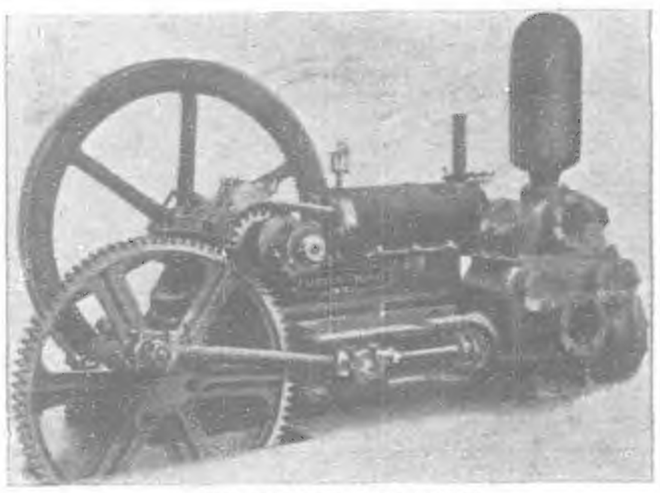
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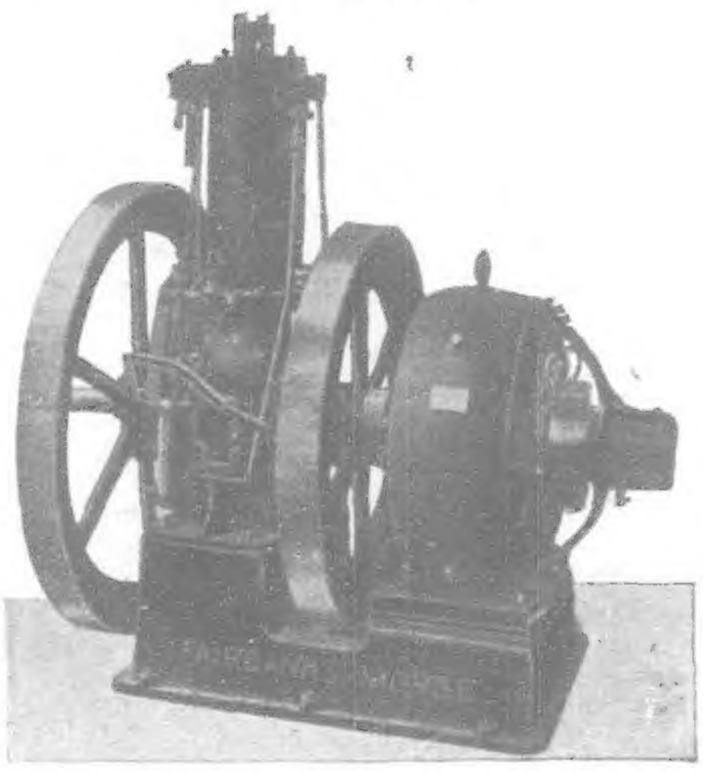
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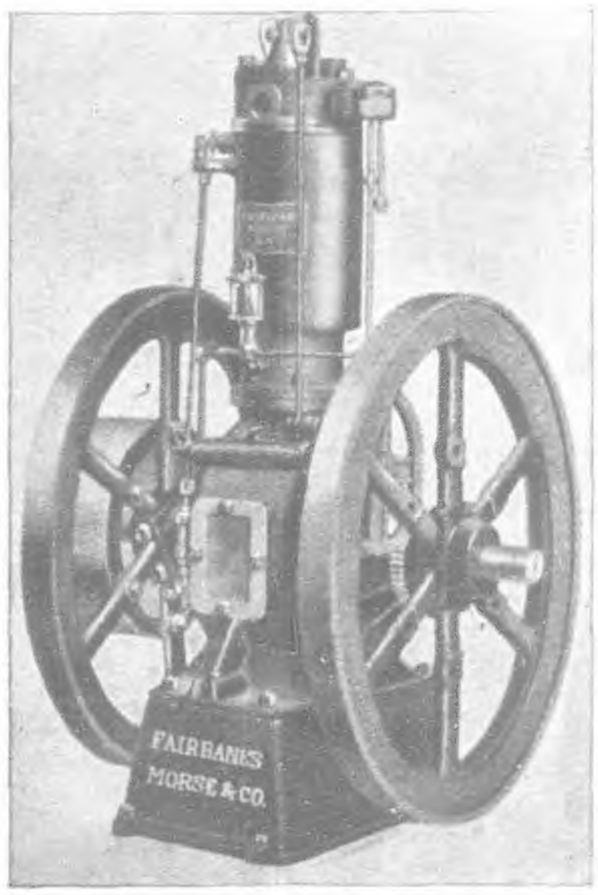
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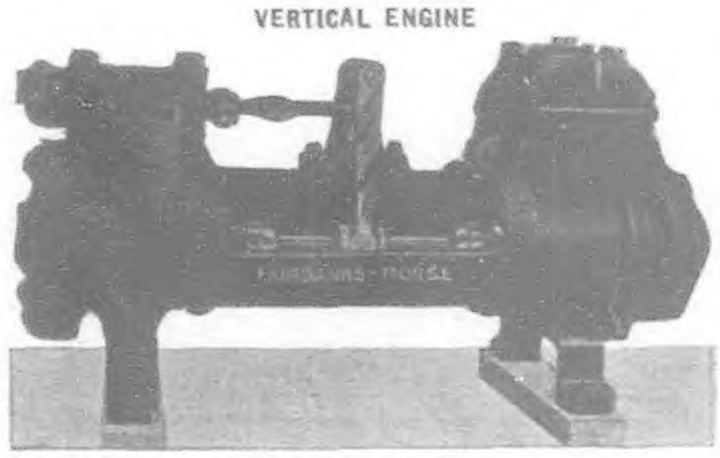
Engineering Department



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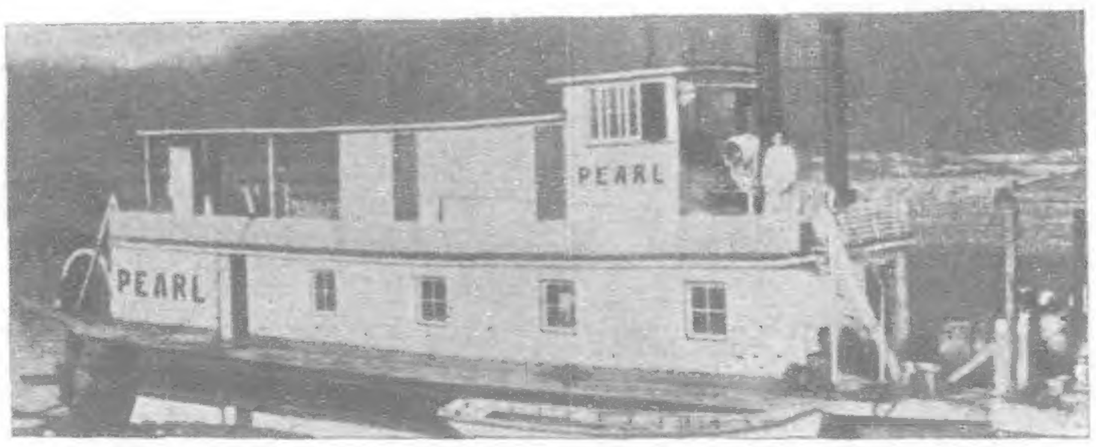


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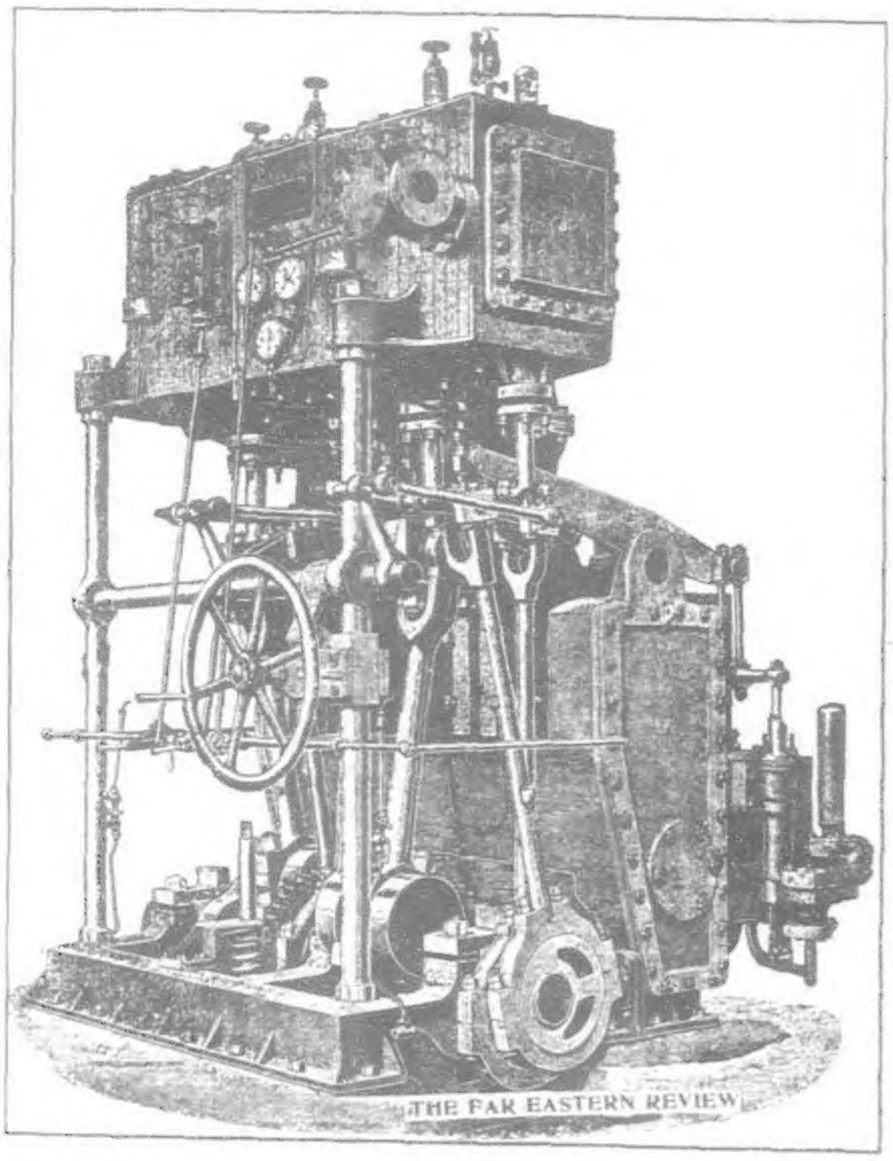
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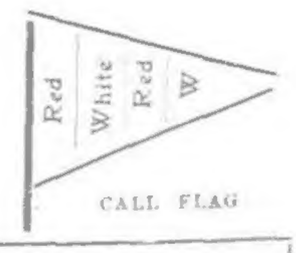


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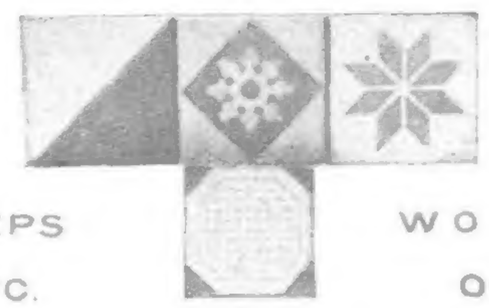
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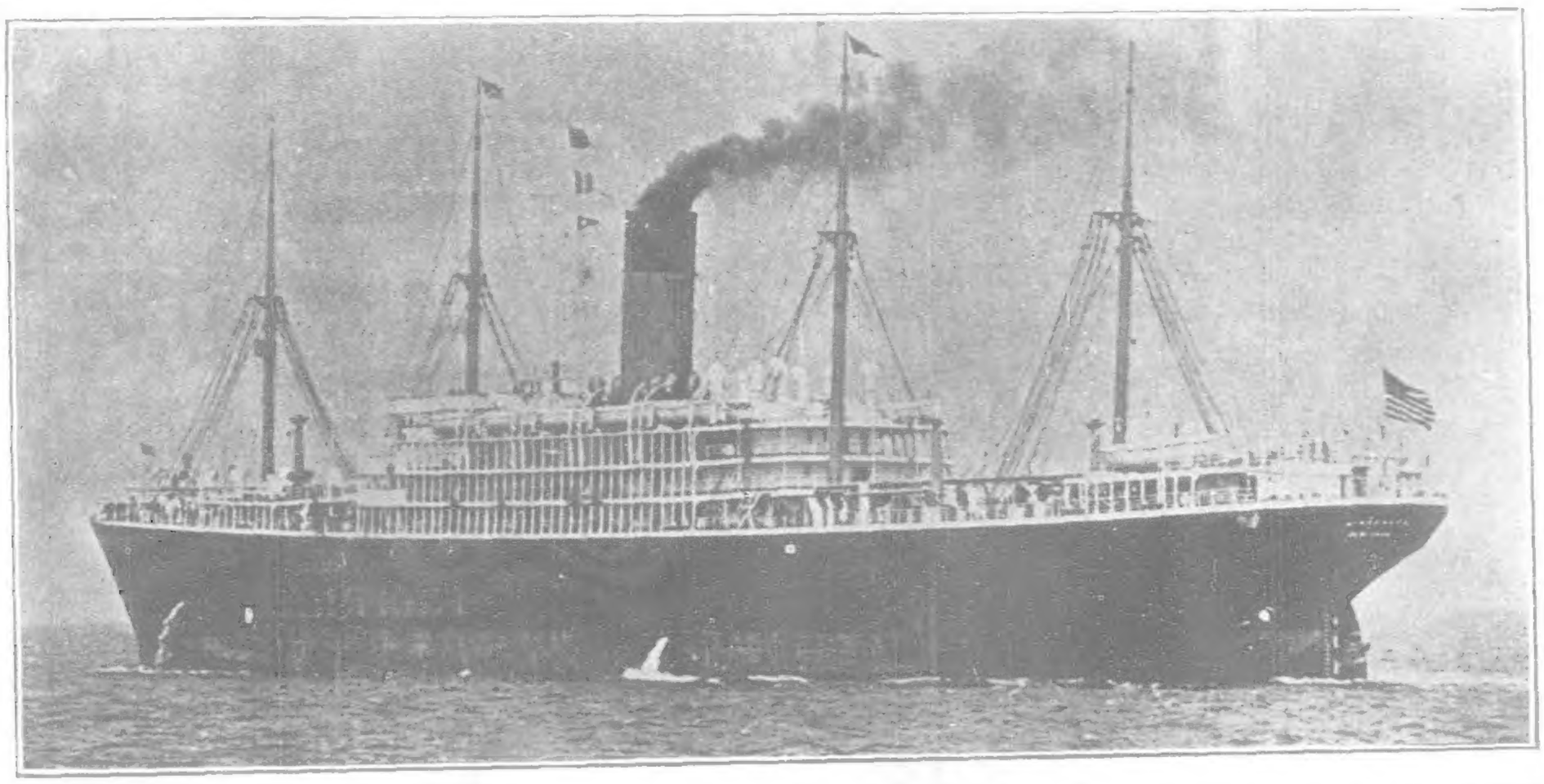


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. . DAKOTA . .	Sept. 2	Sept. 18	Sept. 24	Sept. 30	Oct. 3	Oct. 8	7	Sep. 7	Sept. 11	Sept. 14	Sept. 17	Sept. 20	Oct. 5
. MINNESOTA .	Oct 20	Nov. 5	Nov 11	Nov. 17	Nov. 20	Nov. 25	5	Oct. 16	Oct. 20	Oct 23	Oct. 26	Oct. 29	Nov 13
. . DAKOTA . .	Nov. 28	Dec. 14	Dec. 20	Dec. 26	Dec. 29	Jan. 3	8	Dec. 3	Dec. 7	Dec 10	Dec. 13	Dec. 16	Dec. 31
. MINNESOTA .							6	Jan. 11-07	Jan. 15	Jan. 18	Jan. 21	Jan. 24	Feb. 8
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